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The Public Lighting Tables of the American Meter Company will be found in the page advertisement of that Company.

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BRIEFLY TOLD.

THE RESULTS OF THE ST. LOUIS MEETING OF THE AMERICAN GAS LIGHT ASSOCIATION.—Now that the full records of the 24th meeting of the American Association are about to become public property, it is in every sense a satisfaction to be able to write it down that the convention was an unqualified success, in respect of the main purposes for which it was held. It was feared at one time that the extraordinary conditions that obliged the executive management to put the meeting back a week from the date prescribed by the rules of the Association, would work disadvantageously, particularly in regard to the attendance; and although the attendance was not quite up to that of some other years, it was fully up to the average in point of numbers, which statement also applies to the representativeness of the gathering. The meeting from a technical point of view left nothing to be desired, for the literary matter read and discussed had more than enough vitality to interest the members at the outset and to hold their attention to the end. The officials were alert and capable, so the proceedings were never allowed to drag, and the local committees were indefatigable in their persistent and successful efforts to see to it that the time outside of the technical sessions was pleasantly and harmoniously taken up. The new Board of Officers shows two changes, one of which was unexpected, and although the other was foreshadowed a year ago, many hoped that it would not transpire—in saying there were but two changes, we mean changes out of the ordinary run of regular succession in office. The first of these was brought about by the declination of First Vice-President, Mr. Irvin Butterworth, of Columbus, Ohio, to accept promotion to the office of President. The reasons submitted by Mr. Butterworth for the course determined upon must have been very forceful, else the Nominating Committee would not have acquiesced, but whether forceful or not, we here repeat what our special correspondent "C.," in his special despatches respecting the meeting, printed last week, said: "It is to be regretted that he declined to go on to the end, for his course has been such as to command confidence and respect." The second change was in the refusal of Mr. A. B. Slater, Jr., to remain longer in harness as Secretary and Treasurer; but of him it may be said that his years of useful work for the Association entitled him to obtain his release on demand. No doubt it was an oversight on the part of the Association—an oversight due to the bustle of adjournment—that a special acknowledgment of his labors on its behalf, either through a set vote of thanks, or other form, was not made, but in any event he has the satisfaction of knowing that he labored not in vain, for his good work speaks for itself. The gentleman who succeeds him—Mr. Alfred E. Forstall, of Newark, N. J.—is well known, both through the memory of his father and because of his own capability. The position of Third Vice-President fell to Mr. Geo. G. Ramsdell, of Philadelphia, whose valued services in Association work in general for the past 15 years justly entitled him to promotion. Of President elect Nettleton we shall have something further to say, when we have a sentence or two to write about the paper read by him before the St. Louis meeting. The report of the Committee on Education and Research was notable for the showing made in the instance of the work accomplished in forwarding the development of the "Practical Class, or "Instruction Class." The Committee had only closed the first year of its existence, nevertheless it reported that the "Class" already numbered 76 pupils, all eager and determined to acquire information that would better fit them for the work in which they are either engaged or propose to take up. This result in so short a time insures the success of the Committee on the lines it has mapped out, and is in the nature of a surprise to us; for we must admit that, when the Committee was appointed and considering the radicalness of the departure indicated by the plan upon which it must necessarily work, we were rather skeptical as to the outcome. However, no one can have greater pleasure in awarding to the Committee all possible praise for its intelligent and well-directed policy than ourselves, nor in acknowledging that its success is beyond question. The resolution by the Association directing that the Committee be divided into a Committee on Education and a Committee on Research, each Committee being free to name its Chairman, was a wise move; for it insures fair

permanency of office to the actual leader of the work in hand. The determination to hold the next meeting at Fortress Monroe, although made by the Association in the face of a recommendation from the Committee appointed to name the "place," is in our belief not a thing to go wildly enthusiastic over. It may fairly have been claimed that it was New York's turn to welcome the convention, which New York would have heartily done. Nashville, Tenn., too, asked for the privilege, but the tide turned towards Fortress Monroe; and so, in 1897, the Association will enjoy the unique experience of holding its sessions in a place without a gas works of the "regular" stamp. This, though, is a small matter. In summing up the results of the 24th meeting of the Association the truth is told when it is said that it admirably served the purposes for which the Association was founded.

PRESIDENT HUMPHREYS' ADDRESS AND PRESIDENT-ELECT NETTLETON'S PAPER.—The annual address of President Humphreys was well out of the beaten track, in that he devoted its lines more to a discussion of the ways and means of holding old business and securing new trade, rather than to a recital of and comment on the advances or otherwise of the engineering status of the industry; although it should also be said that his opening chapters are directed to a fair presentation of many moot points in connection with capital account and its influence on the financial standing of the company and the resultant effect on the work of its engineer. Involved in his treatment of the business phase of the industry is a clear presentation of the perplexities that come into the matter of scaled rates for a varying use of gas; but we presume the majority of his readers will conclude that, like an attempt to state the best way in which to introduce gas stoves and so on, this is a thing in which the final adjustment must be largely governed by the factors of local conditions and individual leanings. He also takes up the problem of advancing the use of gas for heating, a result that would, indeed, be vastly worth attaining, and which may be nearer to hand than it was a decade ago. The address bristles with well put points, and its lines reveal to the reader the undeniable fact that its scholarly author neither stinted study nor time in its preparation. The paper by President-elect Nettleton (whose elevation to the highest position in the gift of the Association was fairly won and will be cleverly maintained) on "A Discussion of Various Methods Employed in the Introduction of Gas Stoves," may well be read in connection with the address of President Humphreys, for both have much in common, even though the paper is largely devoted to the practical side of a question, which the address rather treats of on the side of theory. Mr. Nettleton admits that it was with reluctance he acceded to the request of President Humphreys to prepare the paper under consideration; but we imagine that when the discussion over it was at an end no trace of sorrow remained in him that he had conquered his reluctance and performed his whole duty Certainly, too, the members must have more than rewarded him by their brisk presentation of the methods they followed in their individual cases to accomplish the ends that Mr. Nettleton so sensibly arrayed in his paper as well worth trying for. Without hurrah or ostentation, Mr. Nettleton put out his facts and figures, and put them so plainly that he who would fail to make good use of them later on must be dull indeed.

MR. SWINBURNE'S ESTIMATE OF THE BOSTON GAS RATE.—On pages 729–30 of our current issue will be found an abstract of a lecture delivered by Mr. James Swinburne before the English Society of Arts, on "Applied Electro-Chemistry," our abstract relating to that part of the lecture devoted to some speculations on the future of calcium carbide and acetylene. The matter put out by Mr. Swinburne is interesting enough, but it looks to us rather inaccurate in many respects, notably in the statement regarding the first cost of the carbide. It seems that Mr. Swinburne, at one time or another in his history, had charge of a works (manufacturing, presumably) in Boston, U. S. A., which works took gas from the Boston Gas Company, and that the price paid therefor was $2.50 per 1,000 cubic feet. On that basis he goes calmly on to suggest that acetylene gas may have a chance in America as against coal gas, and we call particular attention to that premise as an instance of the "stuff" that one supposed to be qualified to lecture before the Society of Arts unconcernedly retails to his hearers. We may, as Mr. Swinburne says, be "bad gas producers" over here; but the worst of us, were we invited to lecture before the Society of Arts, would look up the facts of our story ere we called the attention of our audience to the truth thereof, or the lack of it. For at least 15 years back the price of gas by the Boston Company has not exceeded $2 per 1,000; for 10 years back it has not exceeded $1.50 per 1,000; and for some time back the rate has not been above $1 per 1,000—the illuminating value of the $1 gas being 25 candles.

[ABSTRACT OF PROCEEDINGS.—Continued from page 690.]

TWENTY-FOURTH ANNUAL MEETING, AMERICAN GAS LIGHT ASSOCIATION.

HELD IN THE PLANTERS' HOTEL, ST. LOUIS, MO., OCTOBER 27, 28 AND 29, 1896.

FIRST DAY, OCTOBER 27—AFTERNOON SESSION.

The Association reconvened at 2:30 P.M., and the President announced that the Association would listen to the

REPORT OF COMMITTEE ON PRESIDENT'S ADDRESS,

which Mr. Littlehales read, as follows:

Your Committee recommend to the Association the most careful study of the address, which contains so many points of vital interest in the operation of our business. We find that especial care has been taken in the study of methods for increasing the consumption of gas, and would urge every member to make himself thoroughly familiar with the contents of the address. Your Committee recommend:

1st. That the Council take such action as may be necessary to bring before the Association an amendment to the Constitution allowing the Council to change the date of meeting, in an emergency.

2d. That the Council obtain from all the members, by mail, an expression of the desirability of so changing the date of our general meeting that it will fall between the 15th and 25th of September.

3d. That the Committee on Education and Research be divided, and that each Committee be left free to chose its own Chairman.

Respectfully submitted, T. LITTLEHALES, HENRY B. LEACH, ALTEN S. MILLER, } Committee.

On motion of Mr. A. C. Humphreys, seconded by Mr. Harbison, the report was adopted.

The President called for the report of the Committee on the proposed amendment to the Constitution, relating to changing clause therein governing the eligibility of new members, which report was read by the Secretary.

A lengthy discussion followed the reading of the report, at the termination of which a motion was carried that the whole matter be recommitted to the Council.

The President introduced Mr. C. H. Nettleton, of Derby, Conn., who read his paper on

A DISCUSSION OF VARIOUS METHODS EMPLOYED IN THE INTRODUCTION OF GAS STOVES.

In appearing before you I confess it is with extreme reluctance, and if it had not been for the urgent request of your President I am positive that this paper would never have been written. I shall have nothing new to say, but shall simply try to collect a number of facts and practices in relation to the introduction of gas stoves, with most, if not all, of which you are familiar, and to them add some opinions of my own, not with the expectation of saying anything of particular value, but that it may be something which will, I hope, start an interesting discussion. I shall confine my remarks almost entirely to cooking stoves, for the reason that they are much more valuable to a gas company than any other form of stove. At any reasonable price for gas it can be demonstrated that cooking by gas costs no more than when coal is used, and in many cases less; that it cooks as well, and in most cases better, and that in warm weather the added comfort of a comparatively cool kitchen makes it a very desirable acquisition to every household. On the other hand, it has yet to be demonstrated that gas can be used permanently for heat without costing an excessive amount.

In a paper by Mr. A. Main of Glasgow, before the North of Ireland Association of Gas Managers, the following incident is related: "Forty-three years ago in 1850, there was a somewhat remarkable scene witnessed in the ancient city of Exeter—an incident having for its central figure a very remarkable man, and notable in itself as being somewhat prophetic of a new order of things in one great department of human economy. In the center of a large crowd, the object of a good deal of jeering ridicule, stood a French chef. The Royal Agricultural Society was holding its annual meeting in Exeter, and this French chef had been engaged to superintend the cooking of the banquet. He tells us that he determined to signalize the occasion by serving a new dish, viz.: 'A baron and saddleback of beef a la Magna Charta,' weighing 535 pounds, or close upon 5 cwt. To roast such a thing at one time was a difficult thing to do on account of the immense heat required, and former attempts, it seems, had not always been suc-

cessful. A crowd gathered in expectation of seeing a large bonfire lighted; but, to everyone's surprise, all that was visible was an oven 6 feet 6 inches by 3 feet 3 inches, constructed roughly with a few bricks and a few sheets of iron. Into this temporary oven were introduced 216 very small jets of gas through pipes one-half inch diameter. The onlookers were incredulous, saying it was impossible so enormous a joint could be roasted by such means. But, after eight hours' roasting it was found to be thoroughly cooked, at a cost (in those days of dear gas) of less than 5s., and it was carried on the shoulders of eight men through the streets of Exeter, preceded by a band playing 'The Roast Beef of Old England,' and followed by a crowd of some thousands. The hero of this animated scene was none other than the illustrious Alexis Soyer, probably the greatest master of the culinary art ever sent to our shores by France." Mr. Main adds that this is the first authentic record that he could find of the use of gas for cooking purposes. That was 46 years ago, and the strides since that time in the direction of cooking by gas have been enormous. In this country the most rapid development has taken place in the last five years, and to-day we see a large number of gas cooking stoves in every city and town in which gas is sold. As a matter of interest, I have sent out letters to 15 of the gas stove manufacturers in this country, asking them to give me, if they would, for use at this meeting, their total sales of gas ranges for the past six years. Nine have replied, seven giving exact figures and two making estimates.

These aggregate as follows:

1890	11,584
1891	13,239
1892	13,566
1893	22,764
1894	42,993
1895	51,869
1896	65,859

These probably represent about 60 per cent. of all the ranges sold in this country, so that I think it can be stated without exaggeration that in the year 1896 very nearly, or quite, 100,000 new ranges have been put to use, and that 100,000 families do their household work better and with less labor and annoyance than one year ago, and also that the gas companies are in receipt of larger incomes by more than $1,000,000 than they would have been if the stoves had not been sold.

In determining on the plan for introducing stoves there are certain general considerations that will occur to the gas manager before coming to any decision.

First, the size of the place. If it be a very large city I think he will say without hesitation that it is hopeless for him, and probably ill-advised to undertake to control the gas stove business. He would give offence to many people, and he could not reach all of his consumers, no matter how thorough and complete his organization, so well as the plumbers, pipers, stove dealers, and the large general stores which handle everything. On the other hand this question comes to but very few of the members of this Association. I think I am safe in saying that the number of gas works in this country whose total annual send-out is less than one hundred million feet exceed those whose send-out is above that figure, by 10 to 1, and while a like proportion may not hold true of the members of this Association, it approximates it, and it is to the managers of the smaller works, whose annual send-out is less than the figure quoted, that I propose to particularly address myself in this discussion.

The *second* consideration which will naturally come into the mind of the manager in deciding this gas stove question, is the character of his consumers. Whether it is a rich suburban town, with consumers largely well-to-do people, or a manufacturing town where most have moderate or small incomes. It is the general experience, I believe, that the very rich and the very poor people do not use the gas stove nearly so much or so freely as those of moderate incomes, especially in households where no servants are kept.

Third.—Another question which must be decided is the price that shall be charged for gas for cooking and heating purposes. Shall it be the same, or a lower price than that which is charged for light? Many companies throughout the country are now, and have been for years, making a special price for all gas used for heating purposes. I have tried in the course of my inquiries while getting up this paper to find out how that system worked, and the evidence is very contradictory. One of the bright men in the meter business who has intimate connections with a large number of gas companies, told me that all he had heard led him to think that it was a poor plan; that in general it was found to work in this way: The first year that the special price was made the gas company was praised for its liberality; the second year fault was found because they sold the same article at two prices, and the third or fourth year the company was forced to lower its price for lighting to the special price which had been made for heating purposes. Another gentleman who has a very extensive acquaintance with the gas companies in New England said that in that section of the country he believed that the result of the special price was against it.

On the other hand, one of our best managed corporations, told me that they have tried this special price for years in a number of places, and that they have never had any trouble. The same evidence comes from a number of companies; and as I stated before, the evidence is very contradictory. Personally I have never seen my way clear to adopt a special price. I cannot see what good reason I could give to a consumer using, say 50,000, or 100,000 feet a month, why I should charge him 25 or 50 cents more per 1,000 feet than I charge his neighbor using 1,000 or 2,000 feet a month, because the former uses it in gas burners for light, and the latter in gas stoves or other appliances for heat. I know the answer, that heating gas is used principally in the day time and lighting gas for a short time in the evening, but I am free to say that the answer would not satisfy me if I were a large light consumer, and therefore I assume that I could not satisfy any one who made such a complaint. But, to companies who charge a price of $1.50 and upwards for gas, the temptation to make a special price for gas stoves is very great, and I am inclined to think most of them who have tried it have so far made money by doing it.

Fourth.—Another consideration will be the personality of the manager of the company, or the man whom he puts in charge of the gas stove business. If the works are so small that the manager must do the work of introducing the stoves himself, he must judge of his own abilities as a salesman, in determining the question as to the method of following this business. If he has natural abilities in that line and is willing to work under many annoying and discouraging circumstances, there is no reason on that account why the company should not undertake the sale of stoves. Or, if the company be large enough so that a man can be employed to devote the whole or a larger part of his time to this business, then in selecting such a man they want to get one, if possible, who has not only a pleasant address, but who is a natural salesman. It is of no use to put a cheap man in charge of such a business. I do not believe that because a man is a first-class salesman therefore he can sell anything and everything, but I do believe there is enough difference between the men whom we would naturally employ to do this work so that one would sell three or four times as many stoves as another. I think the element of personality in the one who sells the stoves accounts for a part, not the whole, but a considerable part of the difference in the results which are reached by various companies.

To the manager of a small or moderate sized gas works who is taking up the sale of stoves for the first time, the number of plans that will be presented to him, if he will take the time to inquire, is large. Shall he give away stoves, rent them, or sell them? If they are sold, shall the gas company do it, or the local dealers? If the dealers, shall he induce them to sell at cost and allow the gas company to pay them their profit, or shall they add their legitimate profit to the first cost? If the gas company sell them, shall it be for cash, on the installment plan, or by a system of free gas rebate the price paid? And shall the gas company sell at a profit, at cost, or less than cost.

Giving Away Stoves or Loaning Without Charge.—This is the most attractive method, barring its cost, of introducing gas stoves, particularly where gas is sold at a low price. An enormous number can be put out in a comparatively short time. It is probably a fact that more families can be induced to use gas stoves in one year in any given community by this method, than in five years by any other method, and the only question is, does it pay? Without going into details it can be stated that the cost of stove and connecting, but not including the cost of service and meter, can be returned to the company from the profits on the gas sold through the stove in from 18 to 30 months. This is figured, of course, on the bare cost of the materials and labor used to produce the gas, and does not include anything for superintendence, distribution and office expenses, which are assumed to be the same whether a company has a gas stove consumption or not. This assumption is only true in part, but is so near the truth for small works and the probable output of gas that I think most present will assent to the statement.

As against it can be urged the large investment, which most companies are not in a condition to make; the rapid depreciation of the stove because, in part, the users are not owners; the almost certainty that the company will have on its hands in a few years a lot of stoves to throw away, because of improvements in the newer stoves, which con-

sumers will insist upon having; and beyond this the fact that with a proper degree of effort stoves can be sold at cost, and while a fewer number will be introduced, and its necessary smaller consumption will be obtained, the large outlay will be avoided.

At the recent meeting of the Pacific Coast Association our fellow member, Mr. Crockett, is quoted as saying: "We are having quite an experience with gas stoves. * * * In connection with Mr. Eichbaum's Company we had been struggling along for a great many years with gas stoves and found it almost impossible to do anything with them. We could sell gas grates, but when it came to cooking ranges it was impossible to sell them at all. I looked over our Company's books only to find we were losing about $500 per month in trying to put out gas stoves. We tried in every way to induce people to buy them, but we were always met with the objection that they already had a stove and did not want to pay for another. I then suggested to our people that we should try the experiment of loaning gas stoves. They said to me, 'How much is that going to cost?' I said, '$50,000;' they said, 'That is a tremendous amount of money.' I said, 'We will show you how much every gas stove ought to burn, and we will write off 25 per cent. every year for losses, and even then we should make a profit ranging from 25 to 30 per cent. on the investment.' They eventually concluded it would be a good business to engage in, and we thereupon ordered a large number of stoves. Previously, in two years, we put out only 237 gas ranges of different sizes, but within six months after we started on the loan system we had applications for stoves so far ahead that it was impossible to fill them. We put out 1,250 stoves in less than six months, and we could have put out more than 2,500 if we had had the stoves in time and sufficient men to put them up."

A company in a good-sized city in this country loaned, without charge, 2,300 stoves in the year '95, and the manager of the company has written me as follows: "From the inclosed circular, which was issued last spring (of 1895), you will learn that we did not give away stoves, but loaned them to consumers on certain conditions, which we purposely made liberal and as little irksome as possible. The plan proved popular with the public, and thus far has been satisfactory to the company. We placed 2,300 three and four-hole ranges during the season, thereby increasing our sales of $1 gas about 35,000,000 feet per year. * * * Being firm believers in the benefits of pushing business and increasing consumption, we think that the rapid introduction of stoves soonest leads to the consummation, and that the more liberal the terms (with proper restrictions to prevent abuse) the faster the installment of gas-using appliances."

On the other hand, in Boston, as is well known, during the recent competition, ranges were practically given away, but since competition ceased that practice has been stopped, and I think it is a fair assumption that the managers thought it a wiser or better policy to sell them, or, in other words, that it did not pay to give them away.

The Renting of Stoves.—The next question which would naturally come to the manager would be the renting of stoves for a yearly charge. I think many companies have had an experience in this line similar to the following: That the stoves were not nearly as well taken care of as where the people owned them; that at the end of one or two years a good many were anxious to have their stoves exchanged for new ones; that they depreciated rapidly, and that in a comparatively short length of time each company renting stoves would accumulate quite a large number of old stoves, which they were glad to get rid of on almost any terms, and that in spite of every effort a good many eventually went into the scrap heap. I confess that this has been my own experience, and I am now declining to rent any stoves and shall be glad when the last rented stove shall have disappeared from the books. I do not know how general the leasing of stoves has become in this country; as far as my inquiries went, with one exception, the practice is decreasing, and the judgment of gas men seems to be against it. In England, however, the custom is growing, and seems to have taken firm root, particularly in connection with the prepayment meter (to which I shall refer again). In an able paper by Mr. Norton H. Humphrys, of Salisbury, read before the Incorporated Gas Institute, in June of this year, he makes this statement:

"The adoption of the plan, in one form or another, of assisting the consumption of gas by letting out appliances on hire, is now becoming so common among gas companies that a few considerations suggested by some years' experience may not be out of place. * * * The hiring department is not entered upon as a direct source of profit, like the utilization of residuals or the crushing of coke. I question whether in any case a fair balancing up of income and expenditure over a period of several years' working would show a result on the right side. Nor would it be wise to look to the hiring department for a substantial contribution towards the balance available for profit. The chief object in view is something beyond placing out as much apparatus as people will take. It is the securing of a particularly profitable line of business, such as summer or day consumption, which enables an increased annual output to be met without a proportionate addition to the capital account. Practical experience has shown that this is only one of many advantages that are secured; and hence the popularity of the hiring system. The manager of the gas works is brought into closer touch with his customers, and is enabled to acquaint himself with their views and requirements in a way that would not otherwise be practicable. If judiciously worked, its introduction will be accepted as an act of grace on the part of the gas company, and as an evidence of a desire to meet the needs of the customers, even if some trouble and expense are necessary to do so. It encourages a good feeling all around, and shows that the sellers of gas have a soul that rises to higher things than the mere pocketing of as much of the customers' cash as the Act of Parliament will allow them to take. The better impression that now exists towards gas companies, as compared with the popular opinions of 15 or 20 years ago, may be partly credited to the introduction of the hiring system. So this plan may be regarded as an advertising line that no undertaking desirous of keeping abreast of the times and making the best of its resources can really afford to ignore."

I think you will all agree that this is an able, concise statement of the benefits of the rental system, and if there was no other way of coming in touch with the consumer or of gaining, in part at least, his good will, I should favor the renting of stoves; but I believe there are other ways, so far as his remarks apply to gas stoves, and that the expenses and annoyance of the rental system can be avoided.

In selling stoves, shall the moderate sized company sell them itself, or leave that business to the dealers?

On the one hand, if the company makes the sale it controls the kind of stove; it prevents a cheap and poor stove being introduced to its consumers, with the attendant annoyance and injury to the business as a whole; it will set the stoves and know that the connection is made in good shape, and, furthermore, it will naturally display an interest in introducing the stoves that will be lacking if left to the average dealer. Besides this, the company is able to control the price at which it will sell the stoves. It may demand a profit, it may sell at cost, or it may sell at very much less than cost, in whatever way it is thought to be for the best interest of the gas company, while if sold by the dealers each stove must bear a fair proportion of profit.

As against this, if the dealers handle the stoves you have the co operation of a large number of men in the community; you will prevent, in a measure at least, their efforts to sell oil and gasoline stoves. Each one of the dealers has his own circle of personal friends whom he can reach better, probably, than any other man. To the speaker it has always seemed the proper way for the small company to handle this business itself, and for the reasons that I have already given. On the other hand, in fairness it must be said that of all the companies that I have made inquiries of, the one that has been most successful adopts the plan of having the dealers sell. With a total of 1,600 families supplied with gas, more than 1,400, or over 90 per cent., are using three and four-hole ranges, and out of the total sendout of gas about half is for fuel. It is but fair to say, however, that the manager of this company is a particularly bright business man, even among the aggregation of bright business men belonging to this Association, and in giving his experience I cannot help the feeling that a considerable part of his great success was due to his own personality.

Somewhat similar to the above is the following: A company in a fair sized city had the stove business in its hands for a number of years, and has recently given it up and placed it with a party not connected with the company, who makes a specialty of introducing gas stoves. The manager, who is an able business man and devoted to his company, thinks he has done the best thing for its interest. I mention this only to show the wide diversity of opinion among managers of gas companies in regard to this business. One company does everything, another does nothing in introducing gas stoves. It does not seem as if both could be right.

In case it is decided that the gas company shall sell the stove, shall it be at a profit, at cost, or at less than cost?

The opinions of the managers vary materially in regard to this. A few years ago I think many were inclined to believe that a profit should be obtained on each stove, so that the business as a whole, including all labor and materials used in setting the stoves, should either show a small profit or at least no loss. That opinion, so far as I can judge, has been changed, and to-day many of the companies are

selling at cost or less than cost. One of our corporations, with connections all over the country, sold in 1890 at cost; previous to 1890 at a profit; from that time to the present they have been gradually reducing their price until now they are substantially setting up the stove at $5 less than cost to them, connected. As a result, in part, of this policy the sales of ranges for 1895 were 60 per cent. ahead of those of 1894, and in 1896 the sales will be double those of 1895. I think, however, it is not fair to claim all of this increase as due to the reduction in the price, as they have in addition during these years done away with deposits to a large extent, and practically all charges for services. It seems to me that this is one of the best plans to follow in introducing gas ranges. Perhaps I am led to make this statement because I have worked along precisely the same lines myself. If the stove is given outright to the consumer, but little value is placed upon it because it costs nothing; if it is rented, it is misused by many because it does not belong to them; if it is sold at a profit, it costs too much to get in the large number that we are all seeking to introduce. But by following this plan—not necessarily selling at $5 less than cost, but some similar plan, say $7 or $10 less than cost—the consumer is obliged to pay something; he owns the property, and for the sake of acquiring that ownership he has parted with some of his money, therefore the stove possesses a value in his eyes that it would not under either of the conditions named above, and in consequence of that it is, I believe, in the long run and in a majority of cases, apt to be better treated, more thought of and very likely more used.

In the matter of payment it goes without saying that the payment should be made as easy as possible for those buying. If they can pay cash for the whole amount, well and good; if not, sell on installments and on the easiest kind of installments. In some paper on this subject the writer advises selling a $12 stove on monthly installments of $1 each: another writer suggests three yearly payments on the lease system, the company owning the stove until the last payment is made. I presume almost all the gentlemen in my hearing have had experience in collecting sums of money from people of very moderate means, by installments, and they know how much easier it is to get the money in this way than by any other. Time and time again most of us have collected bills by installments, that if we had insisted on being paid in full and at once, we would never have gotten except at the end of a lawsuit, and possibly then only by attachment and sale.

A plan has been tried in a city in Illinois which many of you are probably familiar with, and that is if the stove is bought and paid for in cash to give an equal amount of gas free to the party making the purchase, or changing it around, if a party will purchase and pay for a certain amount of gas (to be used within 12 months), the gas company will give him a stove listed at the same amount. It has been a great success, and the day consumption in summer has increased from 30 per cent. in '91 to over 50 per cent. this last year. Many of you will recognize the place, I am sure, from the peculiarity of the plan adopted, and you will agree with me that much of this success is probably due to the constant attention and care which the manager of that company always gives to everything connected with his business.

Many companies have adopted the plan, in introducing stoves, of having cooking lectures in some convenient hall, and inviting consumers and their friends, the lecturer using a gas stove. Where gas stoves are unknown, or where a company is starting out for the first time to introduce stoves, I doubt if a better means can be employed to attract attention to them. Personally I have tried it for 2 years, and have been much pleased with the results, but now that stoves are quite generally introduced in the district supplied by the company I represent, I do not think it would be wise to continue; that is, the same money and effort in other directions will accomplish better results.

My attention has been called to a system of inspection adopted by one company, and which I am led to believe is used in various forms by many. They send out some person, preferably a woman, familiar with gas stoves, to each house having a stove, and a report is made as to whether it needs repairs in any particular, and these are attended to at once. If the user cannot accomplish any desired result, the inspector shows how it is to be done, and frequently demonstrates by actual cooking what she is trying to teach. In one place where this was thoroughly tried, meters that the year of inspection showed a consumption of 500 feet per month, the following year in the same months registered 2,000 and 3,000 feet each month. I know nothing from experience of the working of this plan, but it certainly must commend itself to the good judgment of every gas manager; after having sold the stoves we want them used, not put to one side.

In connection with this I desire to call your attention to the introduction of gas stoves in connection with the prepayment meter. In preparing for this paper I have endeavored to read up everything that has been published in English on the gas stove question in the last few years, and I have been surprised at the number of papers about the prepayment meter. So far as I know their use is very largely confined to England, and there they seem to be in use everwhere, and in large numbers. At a recent meeting of the Tottenham Company the Chairman of the meeting, Mr. Corbet Woodall, who is known to many of our members, made the statement: "That in 50 years that they had been distributing gas they had set 5,764 ordinary meters, and in 3 years that they had been operating the prepayment meter system they had set 3,387."

I have taken the liberty of preparing the following table from the published accounts of the South Metropolitan Company of London, and from the addresses to its stockholders, also published, of that prince of Gas Managers, Mr. George Livesey:

	Whole number of meters.	Prepayment meters.	Stoves rented.	Automatic stoves.
July 1, 1892.....	80,581	1,752	18,720	.....
Jan. 1, 1893	83,292	4,367	19,569	.....
July 1, 1893.....	86,875	9,335	21,600	.....
Jan. 1, 1894.... ...	95,101	10,000	23,095	.....
July 1, 1894	102,411	19,000	29,705	.....
Jan. 1, 1895.....	113,558	25,516	26,307	12,033
July 1, 1895.....	119,242	32,333	37,120	20,817
Jan. 1, 1896.....	132,736	42,949	28,469	29,548
July 1, 1896	141,221	50,091	31,195	37,408

"After being in existence," Mr. Livesey says (in 1892) "nearly 80 years (The Phœnix Company, absorbed in the South Metropolitan, supplied gas in 1816) they had 80,000 consumers," and in 4 years they have gained 60,000, of which 50,000 are prepayment meters. In '92 the prepayment meters were 2 per cent. of the whole number, and in '96, 35 per cent., and of the prepayment customers 37,408, or 74 per cent., used gas stoves.

Incidentally I desire to call your attention to the third column of "stoves rented," showing the extent to which the rental system is carried by that company.

In connection with these prepayment meters many of the companies as you know, not only run the services and set the meter free, but they also pipe the houses, put on cheap fixtures and furnish a more or less elaborate gas stove. To repay them for their investment, which runs from $20 to $30 per customer, they charge for gas sold through the prepayment meters a price varying from 15 to 25 cents per thousand feet above that originally charged. The consumption is sufficiently large so that they think they are getting back in this additional price, the interest on the investment, and a sufficient amount to cover all charges for depreciation. Most of the writers on this subject agree that the investment would not pay except for the gas used in the gas stove; that the consumption for light alone would be too small. You understand, of course, that this system is being introduced into the houses of the poorer classes who have hitherto felt unable to burn gas. In this country very few prepay meters have been introduced, and these are almost entirely confined, I believe, to one city and its neighborhood. It would seem as if the English practice was as far in advance of us in this matter, as we have been in advance of them in the matter of water gas. I think that the next few years will show large additions from this source to the number of gas consumers. In a general way it can be stated that gas companies supply at the present time, very much less than half the families living in their district; I should suppose that it would be possible with this prepayment meter to introduce gas into more than half of the families in an average town, and that each, judging by the experience abroad, will use a gas stove of some description provided the matter is properly pushed, and the cost made low enough.

There seems to be a great diversity of opinion as to the amount of gas consumed by gas stoves, and I have written to quite a number of gas managers scattered over the country, in regard to this. The average consumption varies, first with the price of gas, and secondly, with the size of the stove and particularly whether a water back is used or not. The following report is one of the most satisfactory that I obtained. The manager writes as follows:

"*Gas at* $1.25 *per Thousand.*

Consumption, by ranges with not less than 16 inch ovens in use during summer months only, 7,170 feet.
Consumption, by ranges with water backs, summer only, 15,150 feet.
" by ranges, practically all the year, 20,466 feet.
" by ranges with water backs, used throughout the entire year, coal ranges abandoned, 36,010 feet."

In another city, with fuel gas selling at 80 cents, the consumption is from 26,000 to 28,000 feet per meter. In a Southern city, with gas at $1.00 per 1,000, the stoves average 20,000 feet each, while in a Northern city, with gas at the same price, they have averaged 15,000.

The above are all, with perhaps the exception of the Southern city, given from separate meters, and, of course, state the actual averages. At higher prices for gas the consumption is less and generally can be estimated only, as one meter serves for both stove and lighting. I think the average stove burns not less than $12 per year at $1.50 per 1,000 for gas, and is used mostly in the summer time, although I have heard positive statements that in certain cities the average was not over $1.00 per month, or say 650 feet in each of the summer months.

A wrinkle which was new to me, and I think will be to most of the members of this Association, has been brought to my attention in connection with my inquiries. In going into a new neighborhood where gas stoves are practically unknown, the stove is set up on the sidewalk and connected with the main; small circulars are sent to all the houses in the neighborhood stating the fact and inviting the people out to see the stove in operation, and if they wish anything cooked to bring it along and see it done. This was started in Johnstown, N.Y., and I believe originated with the superintendent of those works, Mr. Robert M. Searle. It has been tried this last summer in Syracuse, and the manager there, whom we are all now glad to hail as coming from this side of the "border," writes as follows: "I can thoroughly and heartily recommend the system."

It has seemed to me in this whole matter of introducing gas stoves the difficulty is to get them started. When once started and working satisfactorily the business is comparatively easy. I think it is John Jacob Astor who is quoted as saying that he found it more difficult to accumulate the first $10,000 than the next $50,000; the first hundred stoves introduced in any community, if they work satisfactorily, make it far easier to introduce the second hundred, and with 200 stoves scattered over a community of 20,000 or 30,000 people, the next three or four hundred will be placed with comparatively little labor and effort.

In the matter of gas companies selling gas stoves I have received a letter from a stove manufacturer which was evidently written to be used in this paper, from which I quote as follows: "As manufacturers of these goods we have felt very keenly the difficulties that have beset us in marketing our ware, by reason of the fact that gas companies handle stoves and will push them into the hands of consumers. The gas companies generally are simply impelled by a motive to secure consumers of gas, and as a rule prefer to buy a cheap grade of goods, and having them once established oppose the introduction of any new improvements or goods of other manufacturers, partly because they do not wish to become involved in supplying odd repairs that may be needed thereafter and partly because they are not in position to take the trouble to introduce new ideas. The result of all this is that improvements are not encouraged, and manufacturers are compelled to simply compete with each other as to who can make the cheapest range and the plainest in appearance."

On the other hand I have received the following from another manufacturer: "From our observation we have concluded that the only way that gas stoves can be crowded to the front in any city is for the gas company to take hold of it themselves and push it. In a few cities the gas companies tried to throw the trade to the retail hardware dealers, and we find that it does not always prove successful, for the dealer adds a fair profit on the stove, and the people are a little bit afraid of putting in any large investment on a new appliance. * * * In glancing over the country and taking the conditions in every town, it is almost invariably the case that where the gas company has sold stoves and crowded them in one way and another, gas stoves are in use extensively, and where it has been left to the dealers to sell the gas stoves, very few of them are in use. There are, of course, exceptions in such large cities as New York and Chicago."

"Who shall decide when doctors disagree?"

I want to protest, however, against the statement in the first letter quoted—"That the gas companies as a rule prefer to buy a cheap grade of goods and having them once established oppose the introduction of any new improvement or goods of other manufacturers." If this is a true statement of the way in which gas companies look at the stove business I do not know it. In my own case I have bought sample stoves, many of them, hoping to find something better than that which I have been using, and have welcomed and been willing to try any new improvement that gave any promise at all of being a success. It is true that we have to meet a demand for a $10 stove and to fill that demand we do not buy a $20 or a $25 dollar stove; in that sense we buy in part a cheap or low priced grade of goods, but we do it only because we must. It goes without saying we would much rather sell the larger and more expensive stoves.

When I started to prepare this paper I thought it was possible to prove that there was one system better than any other; that the evidence that I should collect would probably warrant such a statement, but the further I got into it, the more I learned of the various methods followed and the results obtained, the more I became convinced that the facts would not warrant any such conclusion. It is not so much a question of plan, there are a number of good plans, the whole question of success in my judgment turns on the quantity and quality of work with which the plan is pushed. I may be wrong in this but it has grown on me day by day as I have progressed with this paper, and I am now quite firmly convinced that a reasonable amount of ability, and an immense amount of work will bring success with almost any plan.

In conclusion I desire to say that any criticisms I may have made in the paper, I trust will in no sense be considered personal; they were intended for the methods, not the men back of them; also I desire to thank all the gentlemen who have so kindly and so promptly replied to my inquiries for information; but for this assistance the paper could not have been presented in its present shape. I could wish that it were shorter, but I realize, of course, that, long as it is, it is not complete in all details. I can only hope that between the discussion which I trust will follow, and the paper itself, some points in regard to the introduction of gas stoves will be definitely settled.

Discussion.

The President, in inviting discussion, remarked that they had listened to a paper brimful of practical interest to all. He had asked Mr. Nettleton to prepare the paper because it seemed the time had come when a re-discussion of the stove problem was pertinent. As the paper showed, different companies followed different methods in putting out stoves, wherefore the paper and discussion should result in adding much to their knowledge as to the best way or means of getting stoves in the houses of their customers.

Mr. E. G. Pratt, at the invitation of the President, opened the discussion by remarking that Mr. Nettleton had thoroughly covered his subject, and in such a way that those who heard him could hardly take issue with him. In fact, about all there was left to be said might be a few suggestions by way of wrinkles or novelties that may have been suggested by the experiences of others. Mr. Pratt then went on to say: I agree with the writer that the gas cooking stove is much more valuable for a gas company to push than is any other kind of stove, for the reason that it comes nearer an article of necessity than does the heating stove; also, because a cooking stove is fast becoming popular for winter as well as for summer use, owing to the convenience and the perfect control which the cook has over it, wherefore we should encourage as far as possible such arrangements in the kitchen as will preclude any other range or means of cooking than a gas range. The point is well taken by the writer that neither the very rich nor the very poor are users of the gas stove to any great extent, it being probably the experience of most that families having moderate incomes are those who make the most general use of the gas stove. In other words, it is adopted, and gives the most general satisfaction, in homes where the housewife has general supervision over the affairs of her kitchen. The theories of economy and efficiency are frequently destroyed where the operation of the stove is turned over to a servant. I must confess, however, that experiences of the past summer have frequently caused me to think that any family obliged to provide itself with some means of sustenance could do it as cheaply with gas as with any other fuel, provided it had sufficient means to furnish fuel of any kind. I suppose all our experiences go to show that we have complaints to contend with, and that so it always will be; but my experience shows less complaint from people with moderate incomes in the use of gas than from those who are termed well to do. Referring to special rates for gas used for fuel purposes, I have tried both methods; and, in my opinion, a reasonable price for all purposes is more satisfactory than a special rate for fuel purposes. Of course, if there is a great difference between the two rates, the lesser rate for fuel would have some attraction; but it also has the disadvantage, as suggested by the writer, of causing dissatisfaction to the consumer, and especially the large consumer, who claims that if gas can be sold for one purpose at a less rate, there is no reason why it cannot be sold for all purposes at the lesser rate, and especially to large consumers. The argument, I presume, which we all use does does not satisfy the consumer that we are right and he is wrong. I am firmly of the belief that the sale of gas appliances, and the consequent increase in our business, requires the same amount of energy, although perhaps differently applied, that is required in any other business,

and the man who acts as salesman for gas appliances should be thoroughly equipped in everything that is requisite for a good salesman. Such a man is very difficult to secure, for the reason that, while he may be a good salesman, as the term is usually applied, it requires time and study for him to become as thoroughly posted in the application and use of gas for domestic and mechanical purposes, and this can only be acquired by experience. In summing up the best method of disposing of gas stoves, as to whether they shall be given away, loaned without charge, rented or sold, I am inclined to agree with what I assume to be the opinion of the writer—that the most satisfactory and the best permanent results are derived from the actual sale of the stove to the customer. Whether the price received therefor be the cost price of the stove or less than cost, so long as the customer has something invested in the stove he naturally thinks more of it, and will make greater use of it than if it is the property of the gas company, or some other concern, that he realizes has placed a stove at his disposal for the purpose of using its product, and naturally he is suspicious that the large investment in gas stoves by the gas company might have been placed for the better purpose of reducing the cost of its product to him. The renting and loaning of stoves, it seems to me, must be very annoying to a company so engaged, for the reason that the consumer naturally wants the best there is to be had, and one season's use of a stove belonging to someone else would make it an old stove for him, so to please him a new one has to be furnished. I have tried to interest stove and hardware dealers in the handling of gas stoves, but with very little success. Their failure to succeed, however, has been no doubt due to the fact that we have continued to handle stoves ourselves at the same time, although we have given the dealer every opportunity by agreeing to pay him a reasonable profit upon each stove sold, provided he would sell at the same price we sold at, he being relieved of every expense and annoyance incident to the setting up and care of stove. During the past summer we made just such an arrangement with the leading hardware dealer in our city, and while he has made an attractive display, and has sold stoves at practically the same price that we are selling at—namely, less than cost—yet he has been unable to dispose of more than a half dozen, while we have sold as many hundred. I agree, therefore, within such limit as is prescribed by the writer, that a gas company can handle stoves to better advantage than can a dealer; and the principal reason that so many stoves have been placed by companies in the past two or three years was due, I believe, to the fact that the stoves were sold so cheaply and upon such reasonable terms as to be within the limits of nearly everybody. Speaking of oil and gasoline stoves, I believe dealers in that class of goods will not be burdened with business in a community where the same or similar inducements have been offered in the use of gas, as has been the case with many of us during the past year. In the past it was no uncommon thing to witness about our streets the transfer wagons of stove dealers delivering to their customers gasoline stoves in such numbers as to sometimes discourage us; but it is a fact that during the past summer I saw but two gasoline stoves thus transferred, except to our own wagons, as we took them in part payment for gas stoves; and I am sure my observation has been as careful and close as heretofore. Speaking of the taking of gasoline stoves in part pay for gas stoves, while not adopting this as a general rule, we have done it in many instances where the would-be purchaser had recently provided himself with a gasoline stove and did not feel that it could be thrown aside and a gas stove substituted without realizing something upon the investment. The amount allowed in the majority of instances, although only nominal, was enough to satisfy the customer that it had not been a dead loss to him. As to whether a stove should be sold at a profit, at cost or below cost, it seems to me that it should be sold at as low a figure as the local conditions and circumstances will permit, and experience is about the only way this much discussed question can be determined. In other cases during the past summer we have sold stoves, not only at a price less than cost, but for every purchaser of a gas stove we ran a free service pipe; in addition to this, a reduction in the price of gas from $1.50 to $1.30 has furnished a great impetus to the sale of gas stoves, and the consequent increase in our gas sales; all of which, although I have made no careful estimates, I believe in the general round-up will be eminently satisfactory, for the reason that every gas stove sold is a consumer gained, and the consumer will continue to use gas indefinitely.

Mr. Littlehales said the Association owed much to Mr. Nettleton for previous papers read by him, and that the one now contributed put them under further obligations. Continuing, Mr. Littlehales said:

The secret of the whole question of introducing gas stoves is undoubtedly revealed in the remark, near the end of this paper, that "The question of success turns on the quantity and quality of the work rather on the plan that is pursued." Mr. Nettleton's remarks brought to my mind that couplet of Pope's:

> "For forms of government let fools contest,
> Whate'er is best administered, is best."

But from a poor or indifferent method well worked superior results are oftener obtained than are secured by better methods half worked; and as our minds and ideas are not all alike, a line in which one man can secure excellent results may be entirely impracticable to another. But the man who makes up his mind to "get there" will generally be able to discover a way by which he can reach the destined point. Yet the pioneers in new and useful departures deserve our grateful acknowledgement. I have had rather an interesting experience during the past summer in this part of the gas business. Although rather late in the season in getting to work in the cooking stove department, in consequence of pressure of other work, the Syracuse (N. Y.) Gas Company has put out, during the past season, 275 new cooking ranges, and have 268 distinct and reliable promises for new ranges next spring; not a bad result, we think, for the time. The most successful method with us was the one referred to in Mr. Nettleton's paper, as originating with Mr. Searle, of Johnstown, N.Y., whose success in introducing stoves and increasing business has been almost phenomenal. It is necessary to have in charge of canvass an A 1 man, combining all the necessary qualifications for the work. Our canvasser had for the time specially alluded to hereafter three assistants. The line of procedure was as follows: Streets having been selected by the canvasser, connections were made in the boulevard to existing service pipes, or new services were put in as far as the boulevard, in places where we expected to put services in the future. To these services a 4-hole cooking range was connected up, and our portable cooking school and public bakery were ready for business. The first thing in the morning, while the range was being connected up, the canvasser went from house to house distributing a little circular, at the same time trying to get a word with the lady of the house, to call her special attention to what was going on, and give her a verbal invitation, as well as that contained in the circular, to bring something to be cooked. The stoves are set up at such distances as will not be more than a block or a block and a half apart, so that people will not have too far to go to witness the operation. The interest of every man, woman and child on the street was aroused, and talk about gas stoves was uppermost in the conversations of the neighbors in their homes. In many cases sales were effected to persons living in the opposite end of the city from where our work was being done, who had seen the operations in passing where the stoves were. One incident in the campaign is worth relating: One day a boy brought a few potatoes he wanted to have baked for himself and chums on the occasion of a little feast they had planned. The man at the stove at first declined to go into that phase of a free public baking; but, on second thought (which in this case was the best thought) he cooked them. In the afternoon the boy's mother came along and inquired if that was the stove in which the potatoes were baked for him, saying that she had never seen any potatoes baked better, etc., etc., and it all ended in selling her a range. This method is most successful in sections where the mistress of the house does her own cooking. In sections where the houses are of a character requiring servants, we found it almost impossible to get the ladies to come out and look at the stoves, so we have another method to reach this class. We have a hand cart, just large enough to carry a full sized range. The salesman takes with him a boy to push the cart, and a length of rubber tubing. He makes a house to house canvass (that is, of course, of such houses as may reasonably be expected to use gas), ascertaining first if they have a gas range. If not, he asks permission to carry his stove into the kitchen to show them what it will do. He lights up, boils a quart of water (they timing it), or puts a pint of water in a frying pan, letting them note how quickly an oyster stew, or anything of that kind, can be cooked, toasts a piece of bread or performs any such convenient operation, and in many cases an order is secured as the result. Another interesting feature which the Syracuse Gas Company has adopted to popularize cooking by gas is this: A number of the leading ladies of Syracuse have formed a "Household Economic Association," the object of which is to establish permanent cooking schools in the city under professional teachers, and thus train so-called cooks to cook—instead of (as is too often the case at present) spoiling good materials. The Gas Company thought it a good move to secure the working interest of such an organization. The Company's office being centrally located, and an extension of the premises offering the necessary facilities, the Directors of the Company authorized me to place at the disposal of the Association the use of a fully equipped class room. This was gladly accepted

by the ladies, and the school is now in active operation, three classes per week being held—Wednesday evening, Thursday afternoon and Friday morning. There are 15 pupils in each class, and each pupil has a complete equipment of the necessary kitchen utensils at her own table. Any details of this school I will gladly furnish to any member of the Association desiring to follow in the same line. The simple fact that there are 48 pupils, not only learning how to cook but how to cook by gas, cannot fail to popularize gas cooking stoves. A special meter is fixed to ascertain the quantity of gas used by the cooking tables and ranges, and at the close of each lesson the teacher reads the meter and announces how much gas has been used and its cost. As to special rates for fuel gas, experiences differ. For 10 or 12 years past, in working under a system of reduced rates for fuel gas, I have not met a dozen people who could not see the reasonableness of the arrangement, when fairly explained to them, because similar principles are adopted in scores of other businesses. For example, there are not many people unreasonable enough to say that, because a railway company can run a special excursion at low rates, therefore an injustice is committed on the public in not reducing all charges to excursion rates; because a dealer or storekeeper finds it pays him to make a bargain day, in which he will sell some special line of goods at cost or less than cost, or even to give away certain articles, that, therefore, he must give away all his goods or even sell them at cost. I believe in special rates and separate meters for fuel gas. I would even go so far as to say that in my judgment it would pay a gas company to sell gas for day consumption at absolute cost, if a day consumption could not otherwise be obtained; and I think I prove it thus. Suppose a company with a daily output of 100,000 feet, which is used chiefly for illuminating or during the evening, and supposing the fixed charges, such as are not affected by the quantity of the output, to be equal to 50 cents per 1,000 feet (or at any other figure) the same reasoning will apply. If the output by fuel appliances, mainly used in the day time, were increased to 150,000 feet per day, it is evident (the fixed charges not being increased by the increased output) that the cost per 1,000 feet for fixed charges would be reduced from 50 cents to 30.3 cents, and thus a saving is effected, or increased profit made, of practically $20 per day. Of course, I do not believe in selling fuel gas or any other product at absolute cost—it is not business; but I simply use that illustration to prove my position. I thank Mr. Nettleton very sincerely for his kind personal allusion.

Mr. Robert Young said he had looked forward with much pleasure to being present at this meeting, and he had been more than repaid already in having heard what the President had to say about gas for fuel purposes, backed up as that had been by the excellent paper just read by Mr. Nettleton. Perhaps, however, I deserve sympathy from you, for we have not a gas stove in use in Allegheny. The trouble with us is that we have to compete with an abundant supply of natural gas, the selling rate per 1,000 therefor being 22 cents per 1,000 feet. A test that I made showed that 1,200 cubic feet of natural gas would accomplish the work in a gas range that required 2,000 feet of our artificial illuminating gas to accomplish, and thus I think I can fairly lay claim to your sympathy.

Mr. Dunbar fully agreed with Mr. Nettleton's conclusions as stated in his paper, that the methods usually followed in a natural gas district could be made successful if systematically pushed. It was only in the last few years gas companies realized the benefit of securing an increase of business through educating people as to the cheapness and value of gas for cooking, etc. The problem is how best to teach the people in our different localities, for that which will answer in one case may not be applicable in another. The chief policy of all gas companies should be liberality with their patrons to a point as far as it is possible to go. He urged that gas should be sold at as low a rate as was consistent with a just return to the shareholders.

Mr. Harper—Mr. Nettleton's paper shows us, I think, that if the methods of introducing gas stoves are not now infinite, they can easily be made so. I believe, as Mr. Nettleton does, that the sort of stoves and the mode of introduction, whether by gift, loan, lease or purchase, are matters governed very largely by local conditions, the size of the town and the financial condition of the company on the one hand, and the status of the bulk of its patrons on the other. While some particular method may work with exceptional success in one place and one set of conditions, it may be totally unsuited to another place and an other set of conditions. My personal preference is for selling outright at cost, or less than cost, according to the class of people among whom we are individually operating. In many communities the prepayment of $10, $15 or $20 would be an insuperable barrier to the introduction of stoves, while the same system with payments on the installment plan would largely nullify the results obtained. I have had experience of the rental system, and can corroborate almost all of the objections to it urged by Mr. Nettleton. By that system it is impossible to avoid having a number, if not a large stock, of second-hand stoves on hand. A moderate sized company cannot face the sacrifice implied in discarding them, and when they are repaired and sent out again the amount of repair and cleaning necessary often more than balances the profit derived from the stove while in use. Then many of these second-hand stoves get into the hands of people who have been induced to adopt cooking by gas through seeing a well governed stove in the gas company's show room. On getting a stove which does not meet their expectations they are disappointed and the company is correspondingly prejudiced. I think the interests of this Association in the discussion of this important paper will be best served by each one giving his experience in the introduction of gas stoves under his own local conditions. Altoona, Pa., is a strictly working class town of about 40,000 population. Gas is sold at $1.20 for all purposes, and services are laid entirely free of charge up to 100 feet. Under these conditions we had in use, October 1st, 2,603 gas appliances of all kinds, 226 of which are cooking ranges and 642 are heaters, the remainder being composed of hot plates, etc. From 1891 to the close of 1895 we had sold 118 cooking ranges and 724 two and three-holed hot plates, the great majority of these hot plates being used in conjunction with Dutch ovens. At the beginning of the past season we cast about for a small, single-oven range that would come within the means of our consumers, and found what we thought would suit at a little less than $8. We decided to sell this range at $6, dividing the payment into three equal installments. We advertised very freely in the public press, on the backs of our gas bills, by exhibition, and every other way that occurred to us. A young lady, whom we had employed for several seasons to give demonstrations of cooking in the office and go to the house of a purchaser to give any needed advice or instruction, we this year employed to canvass the entire city, paying her a definite salary and a commission on her sales. She carried photographs of the stoves we were making special efforts to sell, and this was found to be a good way of enlisting the interest of the people visited. By these means, and in spite of the very great depression of business, we succeeded in selling 104 ranges, besides a large number of other appliances. I attribute our success, in a very large measure, to the fact that we are selling something which meets the need of our consumers.

Mr. Searle thought the introduction of gas stoves was clearly one of analysis, for each stove introduced had its history. In his city (Johnstown, N. Y.) their workmen were induced to canvass amongst their friends, and they also resorted freely to all sorts of advertising, with the result that they had been fairly successful in extending the output of gas for cooking purposes.

Mr. McDonald said they had all been very much interested in the paper and its discussion, and suggested, as something new in the placing of gas stoves, that the landlords of houses be asked to put the stoves and ranges in on the score that these would add to the attractiveness of the apartments they wished to let. He did not mean that his remarks should be taken to apply only to large houses or to fine apartments, but to the living places of the mechanic and the artisan. He thought many consumers could be gained in the large cities if the plan suggested were followed. Nor did he think it necessary to use prepayment meters in such instances. The ordinary meter would do.

Mr. Thompson thought a most interesting paper could be prepared on the influence of local conditions upon the use of gas. Regarding Mr. McDonald's remarks, in St. Louis some landlords experimented on installing gas stoves and fixtures in houses owned by them. He included gas fixtures because it was the custom in St. Louis for tenants to own the fixtures. The experiment, which was a failure, might have failed because the tenure of the tenant in the premises was not a long one.

Mr. C. H. Page followed with an interesting account of his experience in the placing of gas stoves. He thought success in this matter rested on three things, the price of gas, the personality of the manager or canvasser, and the terms upon which the apparatus could be placed. He believed that ranges should never be placed at more than net cost, and very often it would be excellent policy to place them at less than cost. He also thought gas companies should keep good varieties of gas stoves, etc., on display, but did not think that too many sizes from one or more makers should be kept on hand—in fact it might be possible to go too far in this respect, as too great a variety of styles or makes might be confusing to the prospective purchaser.

Mr. Lansden said he always opposed the idea of putting the sale of gas stoves in the hands only of hardware dealers or stove dealers, and especially in respect of allowing such dealers to connect the stoves. The dealer invariably puts the stove in regardless of the size of house

service, and then later on, when trouble arose, the dealer simply turned the complaining consumer over to the gas company.

Mr. Roper followed, advocating the placing of gas stoves by the gas companies, rather than permitting stove dealers to go on with the work, and cited instances in support of his belief. He also gave an interesting recital of his opinion as to how gas companies should look after the stoves, keeping track of their working very much as they would keep track of a meter.

Mr. Cowdery took up the discussion at this point, and we regret very much our inability to report his remarks verbatim, for they were well put and of exceeding interest. They abounded so largely in statements depending so greatly on figures for their coherency that we will not attempt to garble the story by quoting from long hand and memory. We do, however, submit the following table, respecting the classification of some consumers of gas on fuel account in Milwaukee, in that the table was in the shape of a set document. It is as follows:

Description of Use.	Cu. Ft. per Annum.
59 consumers in heating flat irons	6,010,000
50 consumers in heating soldering irons	2,839,000
6 consumers in heating hat forms, glove and hat manufacturers	2,747,000
9 consumers, melting type	2,561,000
1 consumer, coffee roasting	1,800,000
6 consumers, japanning and enameling	1,720,000
6 consumers, brazing	1,368,000
28 consumers, heating water	1,128,000
8 consumers, candy manufacturers	610,000
8 consumers, ripening bananas	509,000
14 consumers, heating glue	460,000
11 druggists, gas fixtures manufacturers and heating chemicals	407,000
24 consumers, heating offices	3,980,000
8 consumers, tempering tools	313,000
6 consumers, heating branding irons	200,000
2 consumers, china kilns	189,000
3 consumers, forges for welding	154,000
1 consumer, heating sealing wax	174,000
2 consumers, broiling meats	134,000
4 consumers, rubber stamp manufacturers, vulcanizing	115,000

Mr. Pinkney, of Utica, N. Y., then explained the methods in use in his city for introducing gas for fuel purposes. So successful had he been that in 1891 they had, to his knowledge, not a single gas cooking stove on the books, whereas now they had nearly 1,100 gas burning devices on their services. In explaining his methods he said he never missed an opportunity to place a gas stove at the service of any church or charitable organization when such bodies were arranging for an entertainment, a feature or detail of which called for cooking of any sort.

The President here called upon Mr. Nettleton to conclude the discussion. Mr. Nettleton thanked the members for the kind way in which they had treated his paper, and replied to a statement or two wherein the speakers differed from him somewhat, after which, on motion of Mr. Dunbar, seconded by Mr. Harper, a cordial vote of thanks was tendered to him.

The Association then adjourned to Wednesday, October 28, 1896, at 9:30 A.M.

(To be Continued.)

The Future of Calcium Carbide and Acetylene.

[Abstracted from a lecture on "Applied Electro Chemistry," by Mr. James Swinburne, before the English Society of Arts.]

This compound has created an enormous sensation in the financial world, or at least in the speculative part of it, during the last year or so. As far as its discovery in America goes, it appears to have been a mere matter of chance—an invention in the literal meaning of the word. The formation of calcium carbon from carbon and lime seems to be a mere question of temperature, and to have nothing to do with electrolysis. It may be that lime and carbon do not react until the lime is fused or the carbon volatilized, and that the temperature of the electric furnace is needed to bring this result about. It is probable, however, that the very high temperature is necessary to produce the reaction, apart altogether from getting the lime and carbon into contact. I have tried some experiments with an oxygen furnace, and have not succeeded in making calcium carbide even when I used a solvent for the lime, so that there was no doubt it came into contact with the carbon. These experiments were not tried thoroughly enough to be conclusive; but they tend to show that an exceedingly high temperature is needed. It is hardly necessary to say that an oxygen furnace—that is to say, an injector furnace fed with an oxygen and coal gas blowpipe—gives a pretty high temperature.

The future of calcium carbide depends very largely on its cost of manufacture. It is, of course, very absurd to take the cost of coal, lime, and energy, and, calling that the cost of the carbide, compare the cost of a candle-power-hour with that of gas as charged to the consumer. The prime cost of gas delivered into the hydraulic main would be the right thing to compare in such a case, and would tell a very different story. On the other hand, the distribution of acetylene may well be much more simple in proportion than that of coal gas. If it is to be delivered by pipes, its only advantage, as far as distribution is concerned, is that the pipes will be smaller. This would make but little difference in the total cost of distribution, as it only reduces slightly the capital sunk in mains. The cost of laying them would not be very much reduced.

The first thing is to get some idea of the cost of calcium carbide. The estimates given vary enormously, as very little has been published as to the actual cost of manufacture. It seems probable, however, that the cost of production—that is to say, the cost of lime, coke, carbon, labor and energy, taking energy at 2½ cents per kilowatt-hour—will be a little over $30. If water is used, the price comes out a little lower; but, as already explained, water power must not be reckoned upon too much, as rents will probably go up soon. It is best to be on the safe side, so we may perhaps take $50 a ton as the final price of electrically-made calcium carbide, capable of giving 5 cubic feet of acetylene per pound, packed and delivered on rail; after paying manufacturers' profits and all charges. This seems a low price; and it may be said that the various aluminum works have all the plant ready, and know exactly the cost of manufacture, and have already reduced the price as far as it will go. The business has, however, really hardly commenced; and there is little doubt that the processes will be cheapened. At present, it is the roughest and crudest method imaginable.

Let us assume the final price to be $50 a ton, and see exactly what its future may be at that figure. Allowing 5 cubic feet of acetylene per pound, this gives in round numbers, $4.50 per 1,000 cubic feet. But calcium carbide is not acetylene. Suppose the treatment with water raises the acetylene to $5, and that it gives twenty times as much light as coal gas, it would correspond with gas at 25 cents per 1,000 cubic feet. Now, let us look at the price of gas. A ton of coal, at (say) $2.50, gives 10,000 cubic feet of gas; so gas should be 25 cents per 1,000 cubic feet. But the ton of coal gives 15 cwt. or so of coke, which is worth something; over 100 lbs. of tar, which is valuable; and 20 gallons or so of ammoniacal liquor. Some of the 15 cwt. of coke is used to heat the retort benches; and labor, etc., has to be paid for. Still the actual value of gas in the hydraulic main is really only a few cents per 1,000 cubic feet, and acetylene has no chance in comparison. The common practice of taking the price—generally the prime cost—of carbide of calcium, reckoning from it the price of acetylene, and comparing it with the price of delivered coal gas, is absurd. In addition, the great difference in lighting power comes in when the acetylene burner, though using little gas, is giving a very powerful light. Except in sitting rooms, people want small lights about their houses, and they want to be able to turn them down at will.

Acetylene may be used for enriching coal gas. Whether or not it will pay, depends very much on the local conditions. Cannel coal is usually employed when enrichment is necessary. The prime cost of gas at any works depends on the price of coal and labor, and on the selling price of coke, tar, and ammonia. The cost of scrubbing and purifying must be incurred in making acetylene on the large scale, and the expense of distribution by pipes and of collection would be about the same in both cases. It is impossible, however, to give any answer as to whether it would pay to enrich coal gas, unless one knows the real cost price of gas in a given case. Thus, to take a rough example, supposing crude gas costs 12½ cents per 1,000 cubic feet, acetylene costs forty times as much. Adding 3 per cent. of acetylene would about double its lighting power; so that, to replace 1,000 cubic feet of gas, we should have 500 cubic feet costing 6 cents, and 15 cubic feet of acetylene costing over 7 cents. It is therefore clear that it will not pay to enrich with 3 per cent. of acetylene at these prices. I have not worked out figures to find the best enrichment for each relation of values of acetylene and coal gas; for it seems clear that, unless the cost of carbide is much less, or the cost of crude gas much greater, than is here assumed, there is no chance of its being utilized in that way. A public company does not make improvements if it can be helped; and of all public companies, gas companies—owing to their constitution and the

sliding-scale arrangement—are least likely to adopt such methods as enriching gas, even with the bye-products of electric lighting companies, who make carbide to get decent load factors. In addition to this, gas is not used only for lighting; it is very largely employed for heating purposes. The incandescent mantle has "come to stay;" and people with gas stoves and Welsbach burners would strongly object to having their gas bills doubled, and their gas contaminated with a body which necessitates their renewing all their gas fittings and removing all copper and brass tops and couplings.

It does not look, therefore, as if acetylene will compete with gas at present. It may be a different matter in other countries. In the United States, for instance, gas is generally very dear. I had charge of works in Boston some years ago, and we paid $2.50 per 1,000 feet for gas. One shudders to think what it must cost in outlying districts. The enormous strides made by the electric light in America are not owing to the good electrical engineers, but to the bad gas producers. Perhaps the gas works are "run" by the urban authorities; this would account for anything. If sulphate of ammonia does not fetch good prices in America, and if tar distilling and the manufacture of dyes are not brought to the perfection they are in Europe, it is quite probable that acetylene has a much greater future there than over here, especially as, in proportion to the inhabitants, water power is much more plentiful, so that power prices may remain low a long time.

The next scheme is to deliver calcium carbide to houses, and let the consumers make their own acetylene. All that is needed is to add water. This sounds very simple. In the beginning of the century, coal gas was to be made on the spot in the same sort of way. All you did was to put coal into a retort, and heat it, and off came the gas. Yet this was never practiced, except in special cases, and gas never came into use generally until it was distributed by pipes ready for consumption. There are, of course, a few country houses and isolated establishments where they make a fluid they call illuminating gas. Exactly the same thing happened with the electric light. Each house was to have a gas engine and a dynamo, and generate its own power. Then the next idea was that the accumulators were to be left at the houses with the milk, and changed next day, week or month. But this never came into practice.

These two schemes correspond very fairly with those of distributing carbide for use in generators, and distributing liquid acetylene in bottles. The generators would always be troublesome in an ordinary house. No doubt the light would be much cheaper and better than that of gas, as commonly used; but that is by no means everything. People forget that the average households are controlled by women. Women may understand people, but they are completely wanting in the faculty of understanding things; and they have the unreasoning conservatism and conventionality belonging to the undeveloped mind as seen in boys and savages. A woman hates everything new, and would never understand how to work an acetylene generator until it had been in use for generations, and it was considered part of the duty of a good housekeeper to make good acetylene, as it used to be to make good beer. Of course, even then it would be done by rule-of-thumb. There is more than this. The first thing a woman asks when she sees anything new, be it a mousetrap or a telephone, is: "Will it explode?" Now, no one can say on his honor that an acetylene generator will not explode. He does not think it will—in fact, he feels sure it will not, and he sincerely hopes it will not; but an explosion might possibly occur. This settles the matter. The only thing to be done would be to utilize a woman's instinctive hero worship and belief in authority, and to arrange that acetylene generators should be recommended by her clergyman or her doctor. I say *her* doctor advisedly, as she does not believe in other women's doctors.

The plan of distributing liquid acetylene in iron bottles sounds more promising, as very little goes a long way, and the bottles could be connected to the house service by the acetylene company without the women of the house having anything to do with the matter. Acetylene is given off, on the addition of water to the carbide, at enough pressure to liquefy in a cold bottle at once, and it might be purified at the same time. It must be remembered, however, that the comparison must be made, as to cost, not with gas burned in the ordinary batswing burner (which is generally not even good of its kind), but with the incandescent mantle. If anyone is going to improve his lighting, he will not take up acetylene, as against the incandescent burner, unless it is better. Acetylene gives, for a cubic foot, about three times the light of the Welsbach burner; so that at $5 per 1,000 cubic feet, it corresponds to gas at $1.68. Gas seldom costs $1.68 per 1,000 cubic feet. Besides, it is easier to put in Welsbach burners. But if a considerable alteration is to be made, the electric light may be preferred.

All the same, there is a very large opening for acetylene, apart from competition with coal gas. For country houses, and in carriages, omnibuses, trains and on shipboard, it ought to have its own way. One of the chief things wanted is a good burner, that will not give off smuts under any conditions. A good portable acetylene lamp is also much needed. If the lamp generates its own acetylene, there is the difficulty of having it attended to properly—at least by maid servants. Even paraffine lamps are seldom in good order where there are no men servants; and the old colza oil lamps never were. There are other difficulties, however. The action of the carbide on the water is so energetic that too much acetylene is given off each time they touch; and some sort of holder is needed. I have tried mixing alcohol with the water, to reduce the vigor of the action, and it works fairly well. I have lately found that this plan has been already fully worked out. Another difficulty is that the water gives off vapor which generates acetylene, so that when the lamp is out of use, acetylene is being produced slowly. This means that the lamp will "smell," and the smell of acetylene is not pleasant. Small bottles of liquid acetylene for portable lamps should be no more difficult to deal with than mineral water siphons, and a small steel tube bottle would run a light and portable 10 candle power lamp for a long time. The want of portability is the great drawback to gas. The electric light is a little better, but not much. The result is that candles are still used. Acetylene lamps would not ruin the carpets, or cement the pianoforte keys together.

Too much has been generally said about the poisonous nature of acetylene. Experiments show that it is not at all a serious poison; and its smell is a great safeguard. It uses so little air in burning that, on the whole, it would be a very much more healthy illuminant than gas, oil or candles, especially if it contains no sulphur. Healthy breathing is not generally sufficiently appreciated yet. Many people still sit in close rooms, and sleep with their windows shut; and the smaller air consumption of acetylene would not really appeal to them very much. Besides, according to experiments recently made on polluted air, the evils of vitiated atmosphere have been greatly exaggerated. Though acetylene, like carbon disulphide, is an endothermic compound, it is not easily exploded. Fulminate of silver only fires it locally. The explosion does not spread. Carbon disulphide explodes under curious conditions. If some is put in a bulb, and an air pump is connected aud used, it will go off. I do not know if acetylene has any analogous properties.

Calcium carbide may come to be used in the manufacture of alcohol, benzine and other organic products; but it is too soon to prophesy its future in these directions. A great deal must depend on its price, and one of the chief items is the cost of electrical power. It is to be hoped that it will soon be made by non-electrical methods, and its cost may then be reduced considerably.

Experiments with Glass Bearings.

Mr. George D. Rice, writing on this subject in *Iron Age*, remarks that until glass bearings for machinery are proven a positive failure mechanics and others interested will continue to experiment. Ordinarily a machine shop test consists in casting a set of box sleeves or solid bearings from bottle, window or flint glass, and putting them into service on a line of shafting or in some machine. The results may serve to prove the success or non-success of the glass bearings in a general way, but the conditions relative to such tests are so varied that the conclusions arrived at are usually unsatisfactory. In order, therefore, to find out something definite as to the practical adaptation of glass for shaft and machinery bearings, a regular series of experiments with several kinds of glass, varied types of bearings, and under different circumstances, were undertaken. White bottle glass, with its composition of silicate of lime, potash and manganese; dark bottle glass, which includes in its make up brick dust, sand, waste lime from gas products, etc.; window glass, with its compounds of silicate of soda, oxide of lead and the like; crystal glass and also flint glass were all tried in various forms with the result that a mixture of best grade of clean bottle glass and ordinary window glass proved the most useful for bearings.

The bearings were cast from this mixture in molds and tested in various ways. The first consisted in casting solid half bearings, such as are marked *B* and *E* in Figs. 1 and 2. In the first case the glass bearings were incased in wood *C*, and the shaft *A* revolved 250 turns per minute, oiled, weighted, and showed no indications of wear after 20 hours' run. Next a cast iron casing, made for the purpose, was put in place of the wood, and run same time under like conditions. This is

shown in Fig. 2, in which *D* is the shaft, *E* the glass bearings, *F* the casing of iron and *G* the bolts for holding same in place. At the end of the trial the glass at the edges next the shaft and at corners of casing was chipped slightly, showing that a glass bearing works to disadvantage when in a rigid casing.

This experiment was further carried out by using sleeves cast from glass, and arranging these sleeves as shown in Figs. 3, 4 and 5, in which the shafts are marked *H* and the glass sleeves *I*. A wood casing was used first, and the shaft run at high speed 24 hours, at the end of which time no alteration was produced in the sleeves. Then a cast iron casing was substituted as shown in Fig. 4, resulting in the glass sleeves cracking in about an hour. Lead casings were also tried, as in Fig. 5, these seeming to be sufficiently elastic to avoid breakage of the glass sleeves, for the latter stood the test well, even though tried in a journal next a heavy double drive belt.

These attempts serve to further demonstrate the need of an elastic support for glass bearings. The next experiment was quite severe, consisting of placing a set of glass sleeves *B* in an ordinary shaft hanger, as illustrated in Fig. 6, in which the shaft is marked *A*. The severity of the test was due to the attaching of a 40-pound extra weight to the wheel shown in Fig. 7, in which the weight is signified *C* and the bolts for holding it on *D*. This unequally balanced wheel was keyed to the shaft next the hanger containing the glass sleeves in the box, as in Fig. 6, and the shaft revolved 80 turns per minute. As was to be expected, the glass sleeves were ground to powder in about 30 minutes.

The next test consisted in bolting a coupling in the manner shown in Fig. 8, in which the studs *G* were adjusted one ahead in each hole, thus throwing the shafts out of line with each other and with the box bearings *E E*. The latter were specially constructed with gauging set screws *F F*, so as to allow any alignment. Glass sleeves were put in each hanger, and the shaft run several hours 180 revolutions a minute. The constant wabbling, which would, of course, seriously affect any

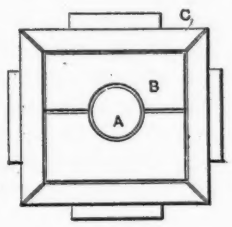

Fig. 1.

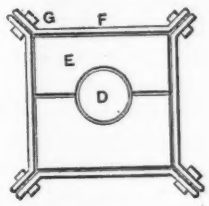

Fig. 2.

Glass Bearings Incased in Iron and Wood.

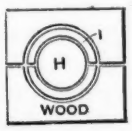

Fig. 3.

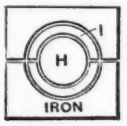

Fig. 4.

Fig. 5.

Glass Sleeves.

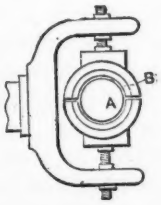

Fig. 6.

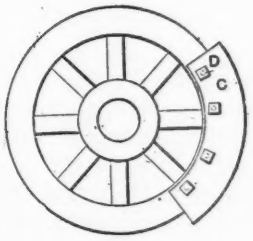

Fig. 7.

Glass Sleeves in Ordinary Shaft Hanger.

type of journal, caused bits of glass to crumble off the edges of the sleeves, one sleeve was broken, on one side the sleeves worn down as indicated at *I* in Fig. 9, in which the shaft is marked *H*.

The next test brought out some points in favor of glass bearings. A shaft was turned down, as shown at *B* in Fig. 10, and the space between the shoulder filled with glass to the dotted line *C*, after the manner of pouring babbitt metal. This made a glass surface, which, when run in a bearing of glass, brought glass against glass, as shown in Fig. 11, in which *D* is the turned portion of the shaft, *E* the thickness of glass surfacing and *F* the regular glass sleeves. This was rigged up in connection with a line of shafting, run without oil two days at 270 turns per minute, driving a large belt, and the bearings heated but little and showed no signs of wear. Then the bearings were oiled, run again without heating at all, and at the present time seem to be in good form. It was also ascertained that friction was reduced.

A simple way to get the friction of a bearing is shown in Fig. 12, consisting of the shaft *A*, to which is fastened the pulley *B* near the bearing to be tested, and around which is wound several turns of cord, *C*. The weight hook *D* is attached to the cord as shown, and weights put

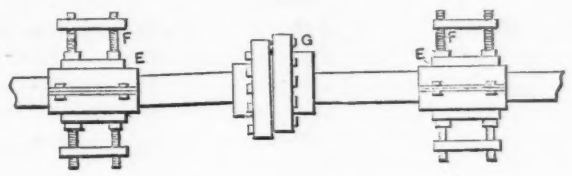

Fig. 8.—*Shafts Out of Line.*

Fig 9.—*Bearing Worn*

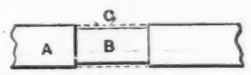

Fig. 10.

Fig. 11.

Poured Glass Bearing.

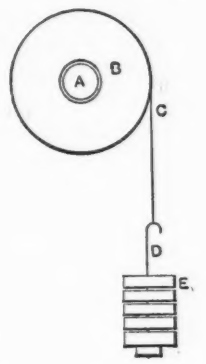

Fig. 12.—*Ascertaining Friction.*

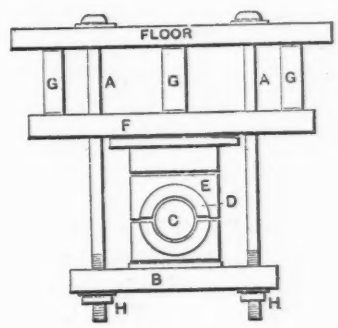

Fig. 13.—*Strain in Bearing.*

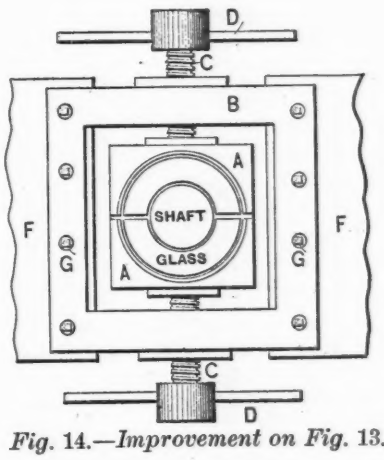

Fig. 14.—*Improvement on Fig.* 13.

on at *E*. The amount of weight required to start the shaft to turning and to keep it going shows the proportion of friction. With this testing device the glass bearings showed a trifle less frictional resistance than like tests with ordinary bearings of metal.

To get at the proportion of strain a glass bearing will stand in conjunction with an iron shaft, the contrivance shown in Fig. 13 was used. The line of shaft is marked *C*, the glass sleeves *D* and the casing *E*. Two bolts, *A A*, were put through the flooring above and through holes in the cross pieces of wood *F* and *B*. Braces *C C C* were next adjusted and pressure from above obtained through these and pressure from below through screwing up on the nuts *H H*. The nuts tightened, the proportion of pressure on the bearings was estimated in regular way by the power required to turn the shaft. It was found that glass bearings would stand about 25 per cent. less pressure than metal before giving out. In Fig. 14 is an improved device for use in such tests, which can be made easily and by anyone. The supports *F F* hold the iron frame *B* in place, while by turning the bars *D D* the screws *C C* can be manipulated so as to put more or less pressure upon the casings *A A*, and the latter, of course, press upon the glass sleeves, and

these in turn upon the shaft. A summary of the tests would seem to indicate that glass bearings are not so reliable in cases of emergency; at the same time glass bearings in ordinary uses and correctly applied require less oiling, develop less friction and are undoubtedly useful in many places, and there may yet be a future for them, regardless of what experiments may bring out for or against them.

ITEMS OF INTEREST FROM VARIOUS LOCALITIES.

ARTICLES incorporating the Aberdeen (South Dakota) Gas and Electric Light Company have been filed by Messrs. John S. Bartholomew, George B. Clifford, William Summers, George W. Jenkins and F. A. Bartholomew. The concern is capitalized in $75,000, and it is in all probability intended to take over for purpose of joint operation the gas and electric lighting interests of Aberdeen.

THE proprietors of the Jamaica (L. I.) Gas Light Company have petitioned the Town Board for the right to lay pipes in all the districts of Jamaica, and the petition was referred to Justice Wood and Town Clerk McCook for investigation and report.

THE Jamaica Plain (Mass.) Gas Light Company has purchased a plot of land adjoining its works, the frontage of the new acquisition being on Kent's place and William street.

THE London (Ont.) Gas Company some time ago constructed a new gasholder, and shortly after it was completed the local assessors, in arranging for the town's tax rolls, increased the valuation of the Company's property for taxation account in the sum of $3,000. The increase was charged to the fact that the holder had been built. The Company appealed from the increase, asserting that the holder had been paid for out of its income, on which income taxes had already been collected by the town.

THE Brooklyn *Daily Eagle*, for October 28th, reports that the trial of the case of W. H. Siebricht against the New York and East River Gas Company, of Long Island City, N. Y., for damages occasioned to plants in his greenhouses through an escape of gas from the mains of defendant, was tried before Judge Gaynor and a jury, and resulted in a verdict for plaintiff for the full amount claimed—$4,550. The plaintiff had large numbers of many varieties of choice flowers and plants growing in five extensive greenhouses, adjoining Second avenue, Long Island City. The owner noticed that the plants were dying, but was unaware of the cause until he discovered that the difficulty was caused by the escape of gas from a leaky main in the street. A top layer of frozen earth prevented the issuance of the gas from the ground until it reached the greenhouses. The Company refused to pay a bill of damages presented by Mr. Siebricht, and the latter instituted suit. The Company in its defense claimed that the fractures in its pipe, permitting the gas to escape, resulted from electrolysis caused by the electric currents that wandered from the "returns" of the local electric railroad, wherefore, owing to this being a new condition on the distribution of gas, the Company could not be held liable for negligence, in that it could not be reasonably held responsible for that which it could not successfully oppose, or even foresee. Counsel for plaintiff in the main asserted that the electric road had only been in operation for a time insufficient to cause the damages complained of, and the jury evidently agreed with the contention of the plaintiff.

JUDGE SCHATZ has handed down his decision in the matter of the authorities of Mount Vernon, N. Y., against the East Chester Gas Light Company, of that city. The authorities contended that the Company did not have the right to open the streets whenever and wherever it found such acts necessary without special permit and contingent license fee. In order that the case might be tried an arrest of one of the Company's workmen was made some weeks ago, and he was tried in the City Court, Judge Schatz presiding. The Company's counsel submitted the provisions of the Company's franchise as his main argument, and the court decided that the franchise permitted the Company to make street openings whenever necessary for the purposes of making proper connections, repairing leaks, laying new mains, etc.

MR. EBENEZER J. HILL, President of the Norwalk (Conn.) Gas Light Company, has been re-elected to Congress from his district.

THE Berlin Iron Bridge Company, of East Berlin, Conn., has been awarded a contract for the construction of a car barn and shop building for an electric road at Port au Prince, Hayti. These buildings will be of steel throughout, having a steel skeleton framework, covered on the sides and roof with corrugated iron. The shop is to be 33 feet by 70 feet, and the car barn is to be 40 feet by 160 feet. This building is only one of many which have been gotten out by the Berlin Company for export to foreign countries during the past few years.

THE JOURNAL for August 17th last contained some mention of a paper on inclined retort benches, that was read before the German Association of Gas Engineers, by Herr Merz, of the Cassel gas works. Mr. F. Behrend, of this city, now informs us that the benches of the inclined type in use at Cassel, as well as at many other places in Europe, were constructed by the Stettiner Chamotte Fabrik, Actien Gesellschaft, formerly Didier, of Stettin, Germany.

THE public lighting of the streets of Washington, D. C., for the next fiscal year, will cost $300,730.

A MOVEMENT was instituted at Plattsmouth, Neb., some weeks ago looking to the leasing of the plant of the Plattsmouth Gas and Electric Light Company, the same to be operated on public account. Under the proposed terms the city was to take over the plant on the basis of a payment on rental account of $2,800 per year, which renting was to last for four years; also, to guarantee the annual interest charge (6 per cent. on $30,000) on the Company's bonded indebtedness. The rental was to cease at the end of four years, after which the authorities were at liberty to purchase the plant outright, at a valuation; otherwise the property was to revert to its owners.

A CORRESPONDENT forwards the following: "This inclosure is to be taken in connection with the previous notices in your item columns of the case of Cadieux against the Montreal Gas Company. The Canadian Court of Appeal has reversed the judgment of Judge Mathieu, in the action of Hector G. Cadieux against the Montreal Gas Company. Cadieux, who resided at 282 St. Charles Borromeo street, Montreal, had used gas in those premises for lighting and cooking for many years. In December, 1895, the Montreal Gas Company turned off the gas and took away its meter, although Cadieux had paid the last account sent him for the place named. The Company was also supplying gas to the plaintiff at the premises 1125 Notre Dame street, and at that point a gas account was unsettled—the gas was also shut off from the Notre Dame establishment. On the first trial Judge Matthieu held that by its contract with the city the Gas Company was required to furnish gas to all residents of Montreal who requested it and complied with the regulations. In this the Judge supported Cadieux's defense, who urged that he was only a bondsman for the gas supply to the named premises in Notre Dame street. The Court of Appeal, however, on a review of the case, reversed that decision, declaring that Cadieux, as a gas bondsman, was equally responsible with Cadieux as a user of gas on his own individual account, especially in that he was dealing with one Gas Company. The decision also recites that Cadieux must settle with the Company in full before he can compel it to furnish him with gas on any account.

AT a meeting of the proprietors of the new Company which is to carry on the supply of gas and electricity in Sacramento, Cal., Mr. J. B. Crockett, of San Francisco, was elected to the Board of Directors, vice Mr. C. E. Green, resigned.

THE following are the provisions of the amended license acts of Los Angeles, Cal., as passed by the Board of Supervisors, respecting the sums that gas and electric lighting companies doing business in the county of Los Angeles shall be called upon to pay monthly for the mere privilege of selling their products: "Sec. 37. Every person or company carrying on the business of manufacturing and selling or furnishing gas shall pay the following license tax, to wit: When the amount of gas manufactured per annum is 5,000,000 feet or under, $3 per month; when the amount manufactured per annum is over 5,000,000 and does not exceed 10,000,000 feet, $5 per month; when the amount manufactured per annum is over 10,000,000 and does not exceed 25,000,000 feet, $10 per month; when the amount manufactured per annum exceeds 25,000,000 feet, $15 per month. And every person or company carrying on the business of producing and selling or furnishing electric light shall pay the license tax hereinafter set forth, to wit: For every plant having in operation not exceeding 500 lights, $2 per month; for every plant having in operation over 500 lights and not exceeding 1,000 lights, $10 per month; for every plant having in operation more than 1,000 lights, $15 per month. Provided that the term 'lights' as herein used shall be deemed to include both arc and incan-

descent, and that in estimating the number of lights as provided herein every 16 candle power of incandescent light shall be deemed to constitute an incandescent light; and every 1,200 candle power of arc light shall be deemed to constitute an arc light within the meaning of this section; and it is hereby made the duty of any such person or company to furnish a sworn quarterly statement of the number of lights in actual operation to the County Tax Collector of Los Angeles county, and in case such person or company shall fail to render such sworn statement as herein provided, then the County Tax Collector shall fix such number of lights in actual operation, and such estimate so fixed by him shall be final and conclusive."

THE proposition to purchase the natural gas plant hitherto operated by the local authorities of Findlay, Ohio, has been renewed. The intending purchasers, one of whom we believe is Dr. Slocum, of Pittsburgh, Pa., propose to erect a works for the manufacture of artificial gas at the place named.

W. L. BAKER and others are attempting to secure from the Houston (Texas) City Council the right to manufacture and distribute a fuel gas, the gas to be made under the system controlled by the "Hall Chemical Company." They are not at all likely to secure the coveted grant.

THE Montclair (N. J.) Gas and Water Company has been awarded the contract for the public lighting of the streets, on the basis of a payment of $17 per lamp per annum.

A CORRESPONDENT forwards the following from Toronto, Can., under date of October 27th: "The 48th annual meeting of the Consumers Gas Company was held in Toronto on October 26th, the Vice-President, Dr. L. Smith, directing the proceedings. The retiring Board of Directors was re-elected, and at a subsequent meeting of the Board Mr. James Austin was re-elected President, Dr. L. Smith was chosen Vice-President, and Mr. W. H. Pearson was appointed Secretary and General Manager. The financial statement showed that the receipts for the year had been $611,349, and that the balance on hand, after ordinary expenses were paid, amounted to $251,443. Out of this the Company paid $170,000 in dividends and charged $50,000 for depreciation of plant, the balance going over to profit and loss account. The assets of the Company were placed at $2,791,776. In presenting the report and financial statement for the year, the Directors report an increase in the output of gas and in the number of consumers during the past year, largely attributable, as in the previous year, to the greater demand for gas for fuel purposes. The slight decrease in the receipts for gas rental shown is more than accounted for by the reduction in the price hereinafter referred to. The report further says: "The Company's appeal against the judgment of the Hon. Mr. Justice Ferguson, in the suit brought against the Company by a gas consumer, was argued before the Court of Appeal on the 22d January last, and, as the Directors were advised and fully anticipated, the appeal was unanimously allowed, with costs. The Directors considered themselves then to be at liberty to carry out their intention to make a material reduction in the price of gas, and accordingly, the net price was reduced on the 1st July to 90 cents per 1,000 cubic feet to all classes of consumers. The Directors are gratified in being able to state that this price is lower than that charged by any gas company in America, with the exception of one city which is much more favorably situated than Toronto as regards the cost of materials used in the manufacture of gas. The Directors believe that this reduction will not only be satisfactory to gas consumers, but will in the end be beneficial to the Company. The appeal against the assessment of the gas mains was not so successful, the court being divided in opinion; but on the advice of eminent counsel the Directors have carried the case to a higher court for adjudication, the question being a very important one, and other courts throughout the Dominion having, in similar cases, favored the contention held by the Gas Company. Eight hundred and eighty eight gas services have been put in during the year, and over three miles of mains have been laid, making the total mileage 230."

THE authorities of Mount Pleasant, Iowa., have contracted with the proprietors of the Mount Pleasant Gas and Electric Light Company for the lighting of the streets by means of arc lamps, the contract to run for five years. The Company has also made an important concession in the matter of its rates for gas supply on ordinary account.

THE following self-explanatory story is from the San Francisco *Chronicle* of October 27th: "Two additional and important steps were taken yesterday toward the consolidation of the San Francisco Gas Light and the Edison Electric Light and Power Companies into one organization. A special meeting of the stockholders of the Gas Light Company was held, at which the Board of Directors was authorized to organize the San Francisco Gas and Electric Company, upon the terms and conditions agreed upon with the Edison people, and the capital stock of the old Company was reduced from $10,000,000, divided into 100,000 shares of the par value of $100 each, to $300,000, divided into 100,000 shares of the par value of $3 each. In entering the new combination the Gas Company stockholders turn over to it all of its street mains and other property used in the manufacture of the illuminating material for $10,000,000 of the stock of the gas and electric corporation. This includes its plants at Howard and Fifth streets, at the Potrero and at North Beach, with the site and new office building on Post street, above Powell. There is other property, however, belonging to the Gas Company's stockholders, estimated to be valued at $300,000, which is not included in the deal, the liquidation of which requires that the old corporation shall continne in existence. Among it is land on Second and King streets, the lot on the corner of First and Natoma, and mortgages held on its property adjoining that was sold some months ago. To close these up the San Francisco Gas Light Company will continue under its reduced capitalization until the stockholders are all paid, when it will disincorporate. The Edison Light and Power Company has already agreed to join the combination, it receiving stock to the amount of $2,750,000 and its outstanding bonds, to the amount of $800,000 with interest thereon, making $1,066,000, being guaranteed by stock to that sum in addition, or $3,816,000 in all. The capital stock of the San Francisco Gas and Electric Company will be $20,000,000, of which $13,816,000 will be issued as follows:

To Gas Company stockholders	$10,000,000
To Edison Company stockholders	2,750,000
To redeem bonds	1,066,000
Total	$13,816,000

The balance of $6,184,000 will be held in the treasury. The idea at present is to insnre the payment of 6 per cent. on the issued capital stock. It will probably be another month before the new Company will actually be incorporated and in condition to do business."

"Small" Inventions.

The English *Scientific Journal* says that the courts are often called upon to construe what constitutes an invention, and some of these decisions are evidences of very clear thinking on the part of the judges presiding. Often several judges sit together on a case, and they are not always unanimous in conclusions; the decision goes with the majority, one of whom writes all the considerations and premises and influencing circumstances which lead the majority of the judges to their decision, and this goes on file and into print as the opinion of the court in the matter. Sometimes, where the decision is not unanimous, a dissenting judge writes a little dissenting opinion, and that is printed too; but the dissenting opinion does not carry weight, although where all the judges concur the decision has a better front. In a very recent decision it was decided that the direction in which a little hole drilled in cast iron was inclined was a matter of invention and properly the subject of a patent, even in the face of the fact of previous unintentional use. The invention related to those gas fireplace logs which have asbestos moss on them, and look, when in use, as if they were being burned, although the fire is really that of burning gas only. It is desirable that the gas flame should lie close to the cast iron fire logs, and that there should not be a little explosion when the gas is turned off. If the little holes through which the gas comes out of the hollow cast iron fire log to be burned are drilled at a sharp angle to the surface of the log, then the flame does lie close, and there is no explosion at the time of starting or stoping the fire. Yet, as the logs are half round, and were laid on a driller table to have several rows of holes drilled in them, it had always been the practice to drill part of the holes inclined and part at nearly right angles to the surface of the fire log.

The invention claimed lay in drilling all the holes at about the same acute angle to the face of the fire log, with the outer opening of the drilled hole higher than the inner opening, which avoids the explosion and makes the flame lie close to the log, and gives more heating effect for the same amount of gas burned. At first sight it would seem that this was a very thin invention; it was shown, however, that it was of commercial value, as making a better and more economical fire log, and it was held that the previous accidental drilling of angular holes lacking uniformity of angular direction was merely slovenly work, while the drilling of the holes all at about the same angle to produce certain valuable results, and the gaining of these valuable results by this intentional uniform angularity of the gas jet holes, was invention, and to be considered the more meritorious because of its extreme simplicity. In general terms, if a new and valuable result is gained, no matter how simple and slight the changes made to gain the novel effect, the courts sustain the patent. It is hard to avoid the conclusion that there was original reasoning used to gain a new effect from very slightly modified well known means; and when, as is often the case, the new effect gained by such a slight change in old means is commercially valuable, the patent is almost always sustained.

THE AMERICAN GAS LIGHT JOURNAL

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MONDAY, NOV. 9, 1896.

The Market for Gas Securities.

The people of the country having emphatically declared for sound money in the recent election, the inevitable result was an appreciation in all classes of securities and an approach to something like intrinsic values in city gas shares. Consolidated opened to day (Friday) at 154 to 154½, and while a like ratio of gain is not recorded in respect of other city shares, these are generally firmer. East River common is 36 bid, Standard common, 83 bid, Equitable, 195 bid. All city gas bonds are very firm. Brooklyn Union is 93 to 96, and the bonds are 105 to 107. The Attorney-General has denied the petition of Lester and others to institute suit declaring the Company's charter void, because the merger was in contravention of public policy. In fact, the Attorney-General's decision supports the legality of the merger in every respect.

The withdrawal of Mr. Addicks from active participation in the management of the Bay State gas properties, the reconstruction of its Board of Directors, and the withdrawal of the suits on receivership account caused a marked advance in Bay State shares, and we believe this stock is now very cheap at the figures quoted. Chicago gas was boomed during the week, and the resumption of dividends may be looked for at any time. Our belief is that almost anything in the gas share list is worth purchasing.

Gas Stocks.

Quotations by Cochran & Close, Brokers and Dealers in Gas Stocks.

35 WALL ST., NEW YORK CITY.

Nov. 9.

☞ All communications will receive particular attention.

☞ The following quotations are based on the par value of $100 per share.

N. Y. City Companies.	*Capital.*	*Par.*	*Bid.*	*Asked.*
Consolidated	$35,430,000	100	154	154⅛
Central	500,000	50	150	.
" Scrip	220,000	..	100	.
Equitable	4,000,000	100	195	..
Bonds, 6's	1,000,000	1,000	105	.
" 1st Con. 5's	2,300,000	1,000	114	.
Metropolitan Bonds	658,000	..	108	112
Mutual	3,500,000	100	222	226
" Bonds	1,500,000	1,000	100	102
Municipal Bonds	750,000	.	..	.
Northern	150,000	50	79	80½
" Bonds	150,000	1,000	..	98
New York and East River..	5,000,000	100	36	38
Preferred	2,000,000	100	65	70
Bonds 1st 5's	3,500,000	1,000	100	101
" 1st Con. 5's	1,500,000	..	85	88
Richmond Co., S. I.	348,650	50	50	..
" Bonds	100,000	1,000	..	..
Standard	5,000,000	100	83	..
Preferred	5,000,000	100	106	..
Bonds, 1st Mortgage, 5's	1,500,000	1,000	108	..
Yonkers	299,650	50	130	.
Out-of-Town Companies.				
Brooklyn Union	15,000,000	100	93	96
" " Bonds (5's)	15 000,000	1,000	105	107
Bay State	5,000,000	50	16⅛	16¾
" Income Bonds	2,000,000	1,000	27	30
Boston United Gas Co.—				
1st Series S. F. Trust	7,000,000	1,000	70	..
2d " " "	3,000,000	1,000		57
Buffalo Mutual	750,000	100	125	..
" Bonds	200,000	1,000	95	100
Central, San Francisco	2,000,000	..	95	..
Chicago Gas Co.	25,000,000	100	78⅜	78½
Chicago Gas Lt. & Coke Co.				
Guaranteed Gold Bonds.	7,650,000	1,000	94	94¼
Columbus	1,069,000	..	..	63
1st Mortgage	1,085,000	..	..	96
Consumers. Jersey City	2,000,000	100	75	80
" Bonds	600,000	1,000	97	101x
Cincinnati G. & C. Co.	7,000,000	100	197½	198
Consumers, Toronto	1,600,000	50	184½	187
Capital, Sacramento	500,000	50	..	30
Bonds (6's)	150,000	1,000	..	.
Consolidated, Baltimore	1,000,000	100	62	63½
Mortgage, 6's	3,600,000	..	107	107½
Chesapeake, 1st 6's	1,000,000	..	..	..
Equitable, 1st 6's	910.000	..	..	..
Consolidated, 1st 5's	1,490,000	..	..	..
Detroit	4,000,000	..	32	33
" Con. Bonds	4,312,000	..	..	82
Equitable Gas & Fuel Co., Chicago, Bonds	2,000,000	1,000	..	101
Fort Wayne	2,000,000	..	78	83
" Bonds	2,000,000	..	82	86
Hartford	750,000	25	..	145
Indianapolis	2,000,000	..	125	132
" Bonds, 6's	2,650,000	..	103	105
Jersey City	750,000	20	180	..
Lafayette Gas Co., Ind.	1,000,000	100	82	87
Bonds	1,000,000	1,000	85	90
Louisville	2,570,000	50	.	..
Laclede, St. Louis	7,500,000	100	28	28¼
Preferred	2,500,000	100	75	80
Bonds	9,034,400	1,000	92⅛	92¼
Little Falls, N. Y.	50,000	100	..	100
Bonds	25,000	..	..	100
Montreal, Canada	2,000,000	100	200	.
Newark, N. J., Gas Co.	1,000,000	..	93	98
Bonds, 6's	4,000,000	..	123	..
New Haven	1,000,000	25	225	..
Oakland, Cal.	2,000,000	..	52	53¼
" Bonds	750,000	..	..	..
Peoples Gas Lt. & Coke Co., Chicago, 1st Mortgage	20,100,00	1,000	..	108
2d "	2,500,000	1,000	104	105
Peoples, Jersey City	500,000	50	..	175
Paterson, N. J.	.....	25	99	102
Rochester Gas & Elec. Co.	2,150,000	50	..	..
Preferred	2,150,000	50	88	..
Consolidated 5's	2,000,000		87½	90
San Francisco, Cal.	10,000,000	100	92½	92¾
St. Paul Gas Light Co.	1,500,000	100	67½	70
1st Mortgage, 6's	650,000	..	84	87
Extension, 6's	600,000	..		..
General Mortgage, 5's	2,400,000	.	88	90
Syracuse, N. Y.	500,000	25	..	..
Washington, D. C.	2,000,000	20	250	.
Western, Milwaukee	4,000,000	100	60	65
Bonds, 5's	3,556,000	.	90	93
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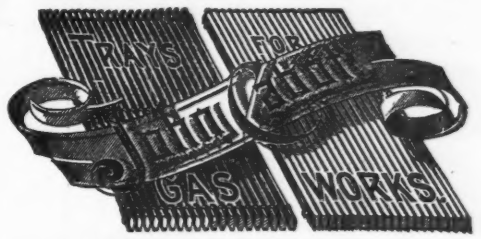

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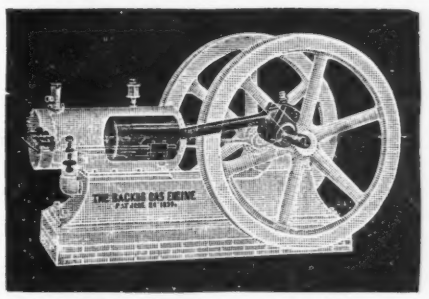

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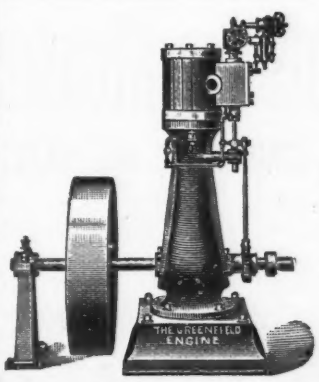

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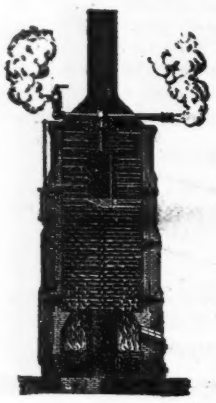

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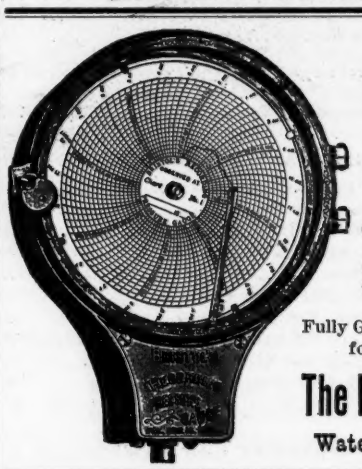

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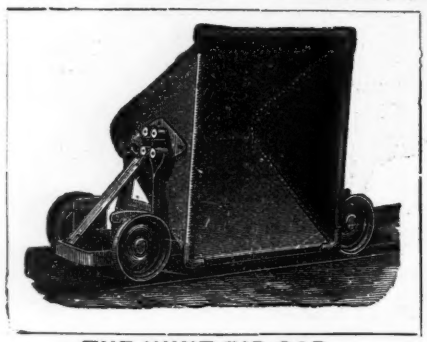

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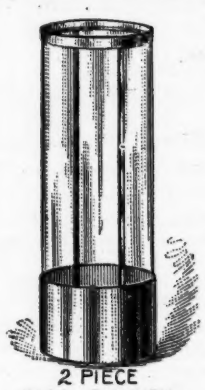

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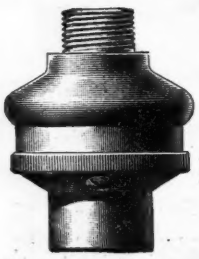

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PROSPECTUS.

THE object of the **Gas Exposition** is to bring together a collection of gas apparatus and appliances of every description, for the two-fold purpose of affording the general public and the gas engineer an opportunity to study the developments that have taken place in the gas industry during recent years. In submitting the plan of the Exposition to those who may feel an interest in the project, the management would call the attention of manufacturers of supplies of every description, entering into the manufacture of gas, to the great benefits which similar affairs have conferred on the industries of Great Britain, Germany and France, in which countries the exhibitions of gas appliances are held with recurring frequency. The creation of a healthy public sentiment in favor of gas is one of the first aims of large numbers of foreign gas companies.

MADISON SQUARE GARDEN.

In the selection of New York for the inauguration of an enterprise of this character, it is believed that no mistake has been made. In this city the Madison Square Garden is looked upon as one of the great show places of the metropolis; it contains within its walls the requisite space for the proper display of an almost unlimited amount of product, without which an affair of this kind cannot hope for the stamp of public approval—hence the selection of this great building for the inauguration of the gas industries exposition during the two weeks beginning January 25, 1897.

The greater New York contains a resident population of 3,000,000 people. Within a radius of 50 miles of Madison Square Garden live 4,500,000 people; reliable statistics show that an average of fully 100,000 strangers visit New York every day in the year. Thus it will be seen that the gas exposition will draw from a population of fully 6,000,000. In this connection it ma be stated that every effort will be put forth that ingenuity can devise to thoroughly advertise the exposition, and create a desire in the minds of the public to come to the show; and once within its portals the dazzling brilliancy there abounding, coupled with the many attractive and instructive exhibits, will cause the visitor to wish to come again.

It is expected that cooking demonstrations will be a feature of the exposition. The lecture and concert hall, situated conveniently near the great amphitheater, in which the exposition is to take place, affords seating room for 1,200 to 1,400 people. The most experienced and talented ladies obtainable will be selected for this feature of the affair, which must prove one of the show's greatest attractions; not only for the housewives who may be attracted to it, but for gas managers, who will thus have an opportunity to study the advantages these gas cooking demonstrations offer as one of the means at hand for the education of people in the uses of gas.

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On September 23d the United States Circuit Court for the Southern District of New York granted an injunction restraining and enjoining the further infringement of our Welsbach patent. READ IT.

UNITED STATES CIRCUIT COURT,
Southern District of New York.

WELSBACH LIGHT COMPANY,
vs.
A. LIEBES.
} IN EQUITY.

The President of the United States,

TO A. LIEBES, and his servants, agents, attorneys and workmen, GREETING:

WHEREAS, It has been represented to us in our Circuit Court of the United States for the Second Circuit and Southern District of New York, that Letters Patent of the United States No. 438,125, were issued in due form of law on the 7th day of October, 1890, to Carl Auer von Welsbach, assignor of the complainant, then known as "Welsbach Incandescent Gas Light Company of New Jersey," and that the complainant herein is the owner of said Letters Patent, and that you, the said A. Liebes, have infringed the rights secured by the aforesaid Letters Patent, by making, using and selling to others to be used, incandescent devices for gas burners, embodying and containing the invention and improvements described and claimed in said Letters Patent No 438,125.

NOW, THEREFORE, We do strictly command and enjoin you, the said A. Liebes, and your attorneys, agents, servants and workmen, under the penalties which may fall upon you in case of disobedience, that you forthwith and forever desist from directly or indirectly making, or causing to be made, delivering, vending, or causing to be sold, offering for sale, using, or causing to be used in any manner, any incandescent devices for gas burners, like, or similar to those which you have heretofore made, used or sold, containing or embodying the invention and improvements described in said Letters Patent No. 438,125, and claimed in the claim thereof, and from counterfeiting or imitating the said invention or improvements or any part or parts thereof, and from in any manner or way whatsoever, violating or infringing the said Letters Patent No. 438,125 and the claim thereof, and from doing, or causing to be done, any other act or thing whatsoever in infringement of the said Letters Patent No. 438,125.

WITNESS, The Honorable Melville W. Fuller, Chief Justice of the United States, at the City of New York, in the Southern District of New York, this twenty-fourth day of September, A. D., 1896.

(SEAL) JOHN A. SHIELDS, Clerk.

(Endorsed) U. S. Circuit Court, Southern District of New York, in Equity.—Welsbach Light Company vs. A. Liebes. Injunction.

A Copy of a Writ of Injunction this day issued out of my office. JOHN A. SHIELDS, Clerk.

We shall proceed against all infringers; manufacturers, dealers and users being equally liable to injunction and damages. The decree of the court awarding the injunction also awards profits and damages. Do not be misled or deceived by guarantees offered by infringers, as such guarantees will not protect you against suit, injunction and damages. For your own protection see that you get the genuine Welsbach light. All other incandescent gas lights are infringements.

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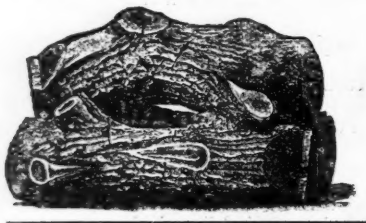

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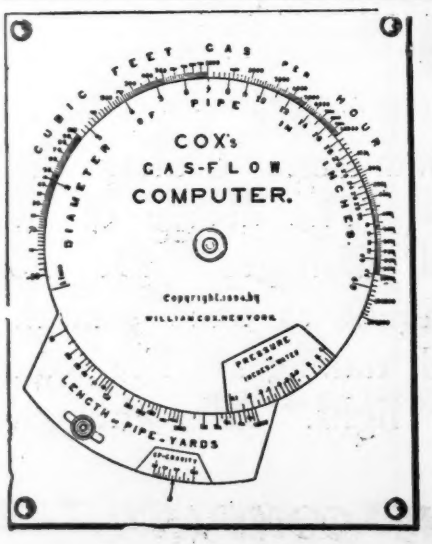

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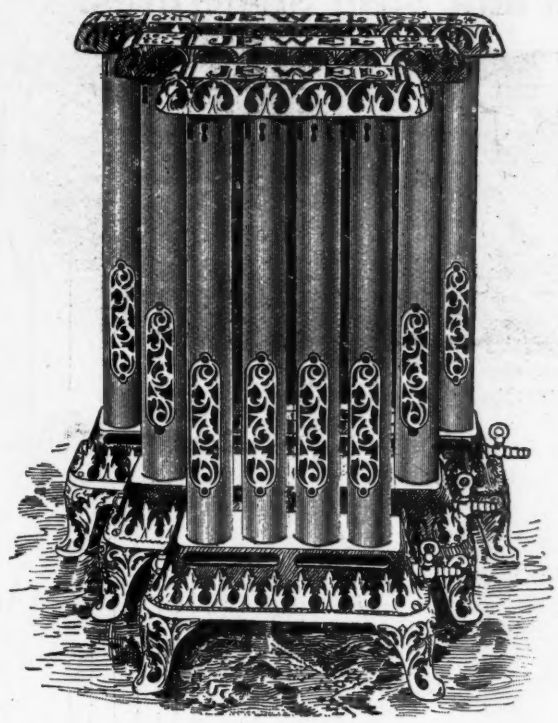

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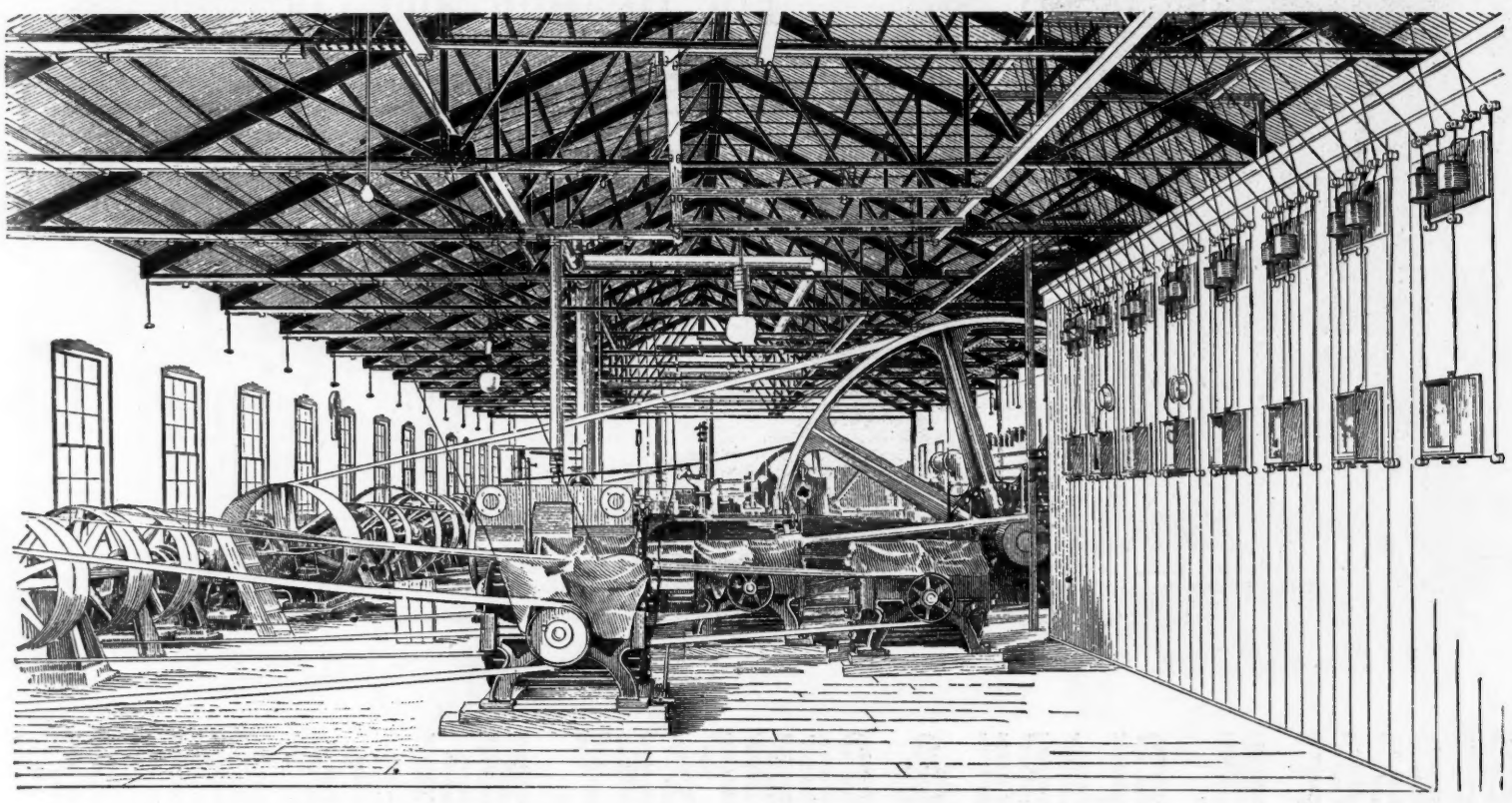

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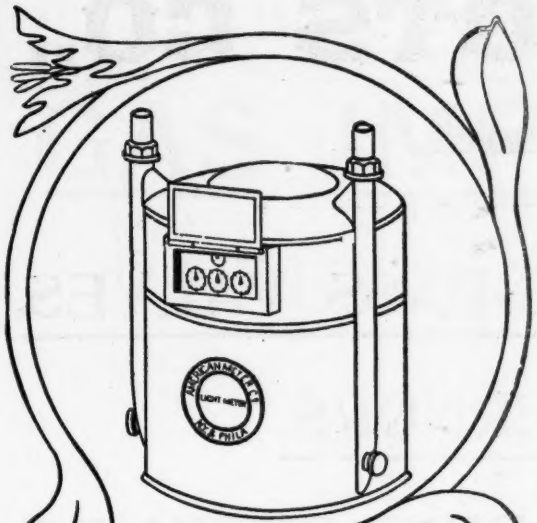

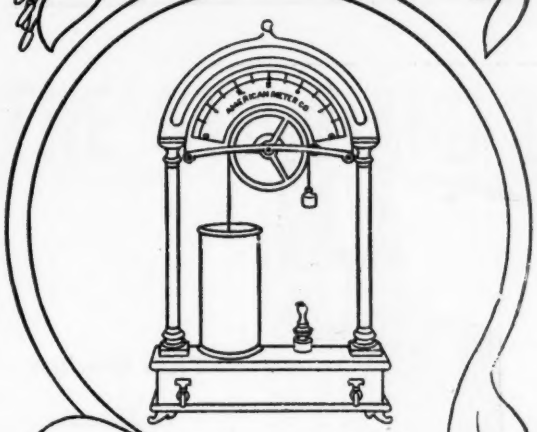

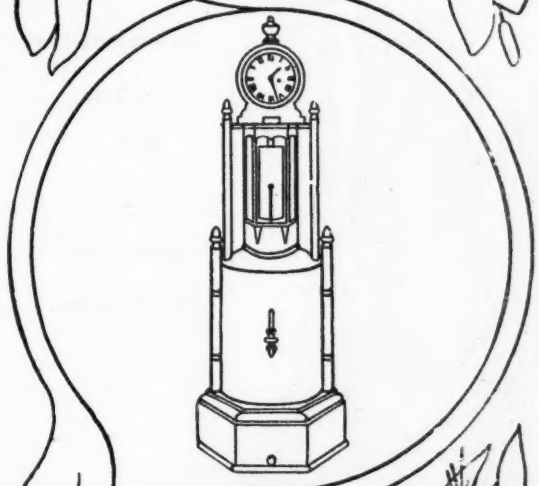

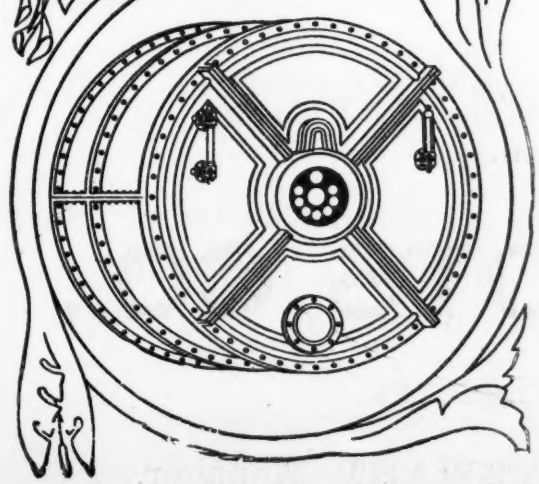

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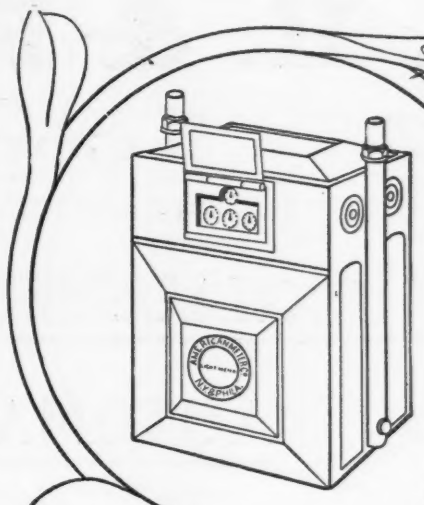
PUBLIC LIGHTING TABLE.

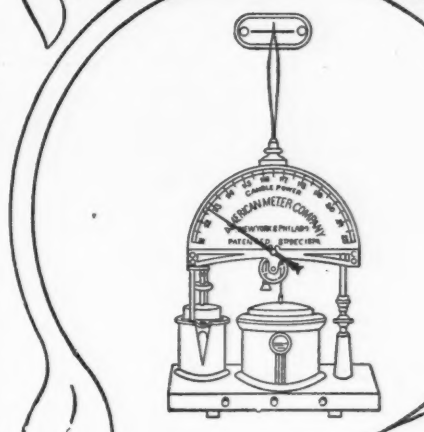
NOVEMBER, 1896.

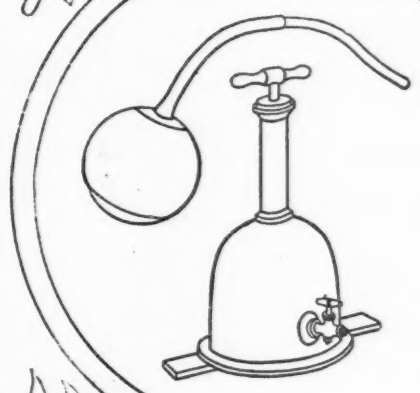
Day of Week.	Date.	Table No. 1. Following the Moon. Light.	Table No. 1. Extinguish.	Table No. 2. New York City. All Night Lighting. Light.	Table No. 2. Extinguish.
				P.M.	A.M.
Sun.	1	5.20 PM	5.30 AM	4.45	5.35
Mon.	2	5.20	5.30	4.45	5.35
Tue.	3	5.20	5.30	4.45	5.35
Wed.	4	5.20 NM	5.30	4.45	5.35
Thu.	5	5.20	5.30	4.40	5.45
Fri.	6	5.20	5.30	4.40	5.45
Sat.	7	5.20	5.30	4.40	5.45
Sun.	8	5.20	5.40	4.40	5.45
Mon.	9	7.50	5.40	4.40	5.45
Tue.	10	9.00	5.40	4.40	5.45
Wed.	11	10.10 FQ	5.40	4.40	5.45
Thu.	12	11.10	5.40	4.30	6.00
Fri.	13	12.10 AM	5.40	4.30	6.00
Sat.	14	1.10	5.40	4.30	6.00
Sun.	15	2.10	5.50	4.30	6.00
Mon.	16	3.10	5.50	4.30	6.00
Tue.	17	4.10	5.50	4.30	6.00
Wed.	18	No L.	No L.	4.30	6.00
Thu.	19	No L. FM	No L.	4.25	6.00
Fri.	20	No L.	No L.	4.25	6.00
Sat.	21	5.10 PM	6.10 PM	4.25	6.00
Sun.	22	5.10	7.10	4.25	6.00
Mon.	23	5.10	8.10	4.25	6.00
Tue.	24	5.10	9.10	4.25	6.00
Wed.	25	5.10	10.20	4.25	6.00
Thu.	26	5.10	11.30	4.20	6.10
Fri.	27	5.10 LQ	12.40 AM	4.20	6.10
Sat.	28	5.10	1.50	4.20	6.10
Sun.	29	5.00	3.00	4.20	6.10
Mon.	30	5.00	4.20	4.20	6.10

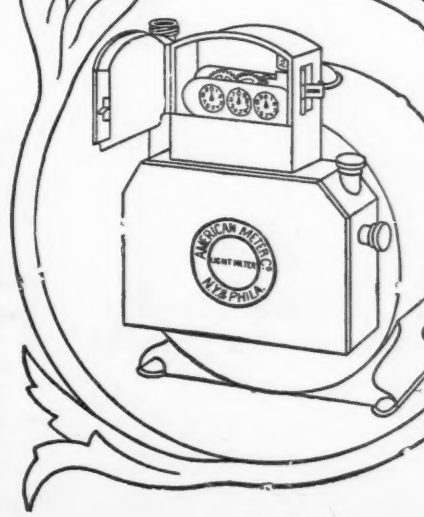
TOTAL HOURS LIGHTING DURING 1896.

By Table No. 1.	Hrs.Min.	By Table No. 2.	Hrs.Min.
January	220.40	January	423.20
February	207.00	February	367.40
March	193.00	March	355.35
April	174.10	April	298.50
May	164.00	May	264.50
June	142.10	June	234.25
July	142.10	July	243.45
August	150.50	August	280.25
September	163.00	September	321.15
October	193.10	October	374.30
November	207.00	November	401.40
December	237.30	December	433.45
Total, yr.	2194.40	Total, yr.	4000.00









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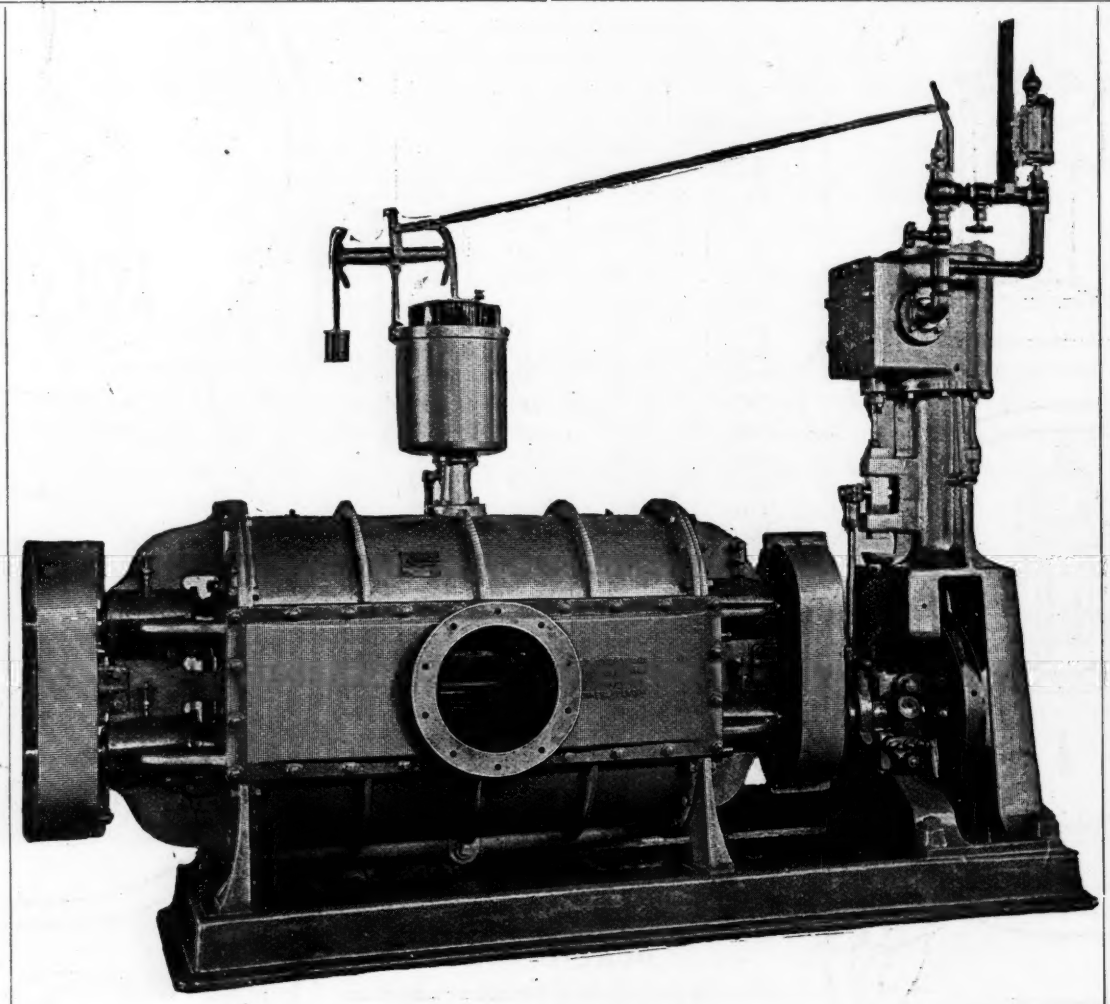

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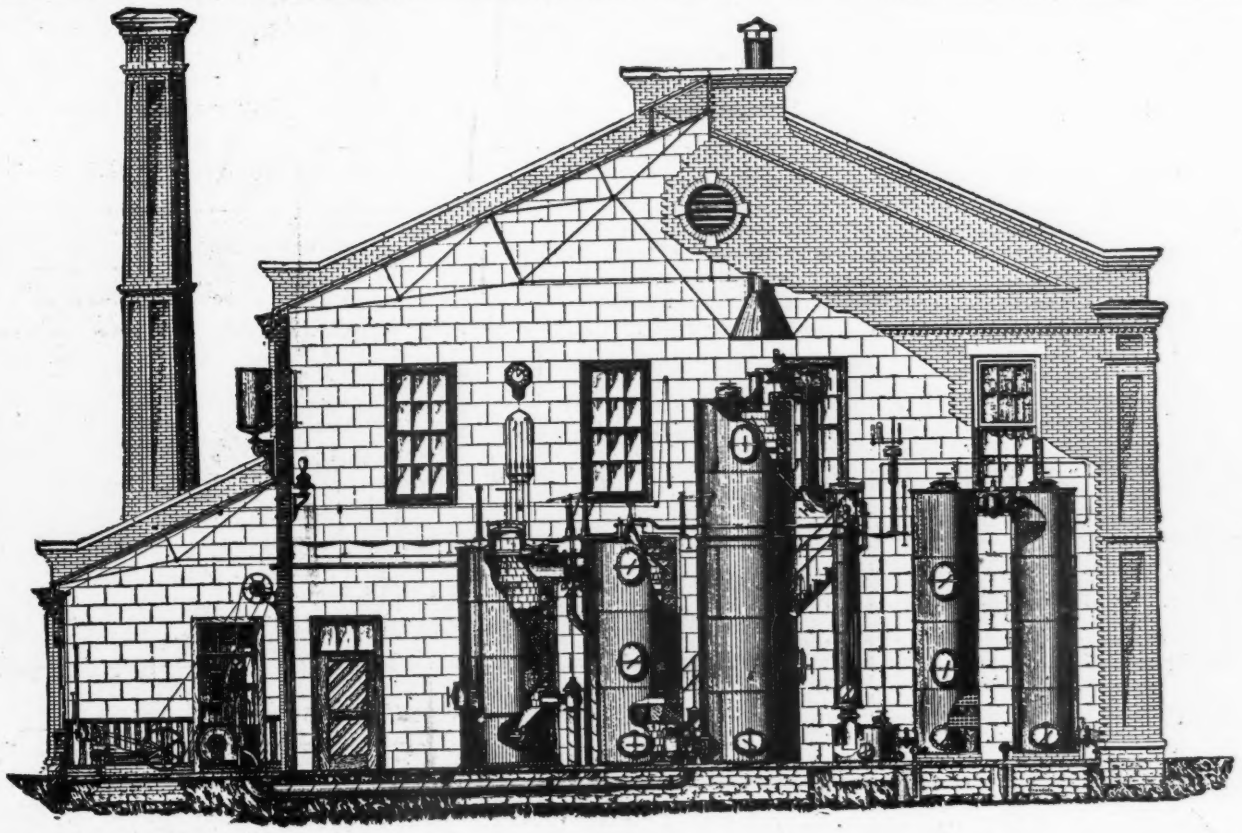

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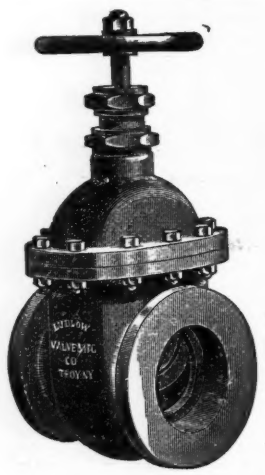

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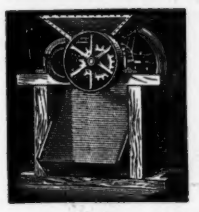

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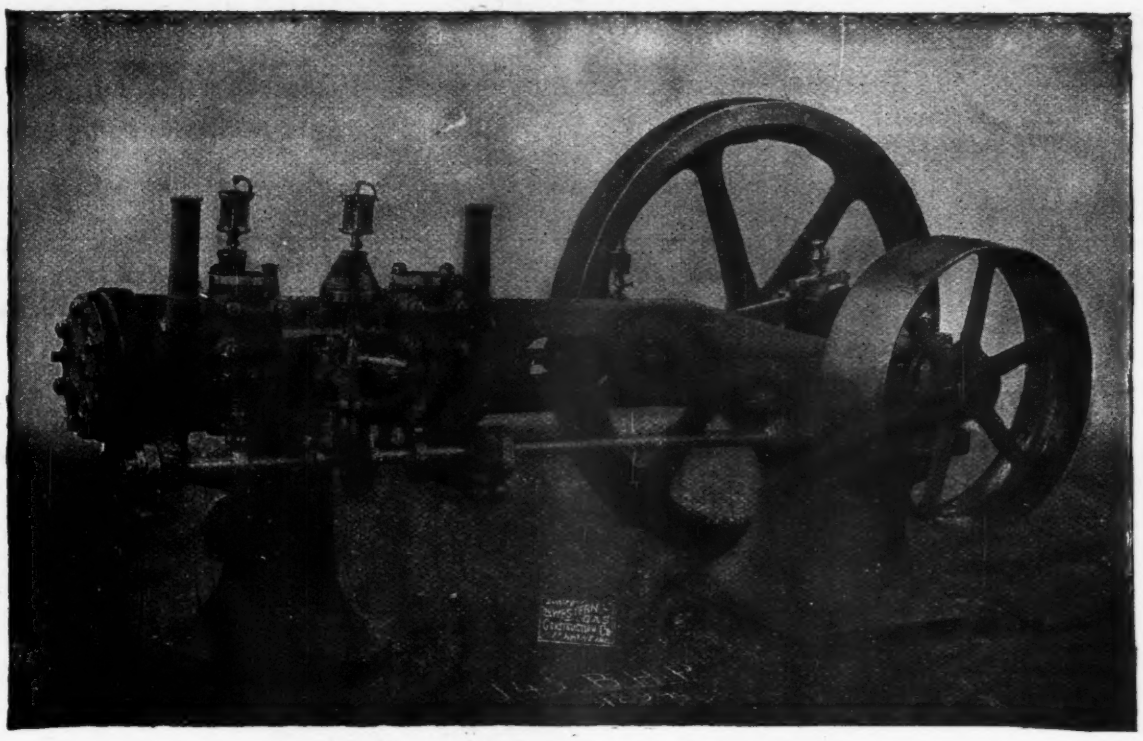

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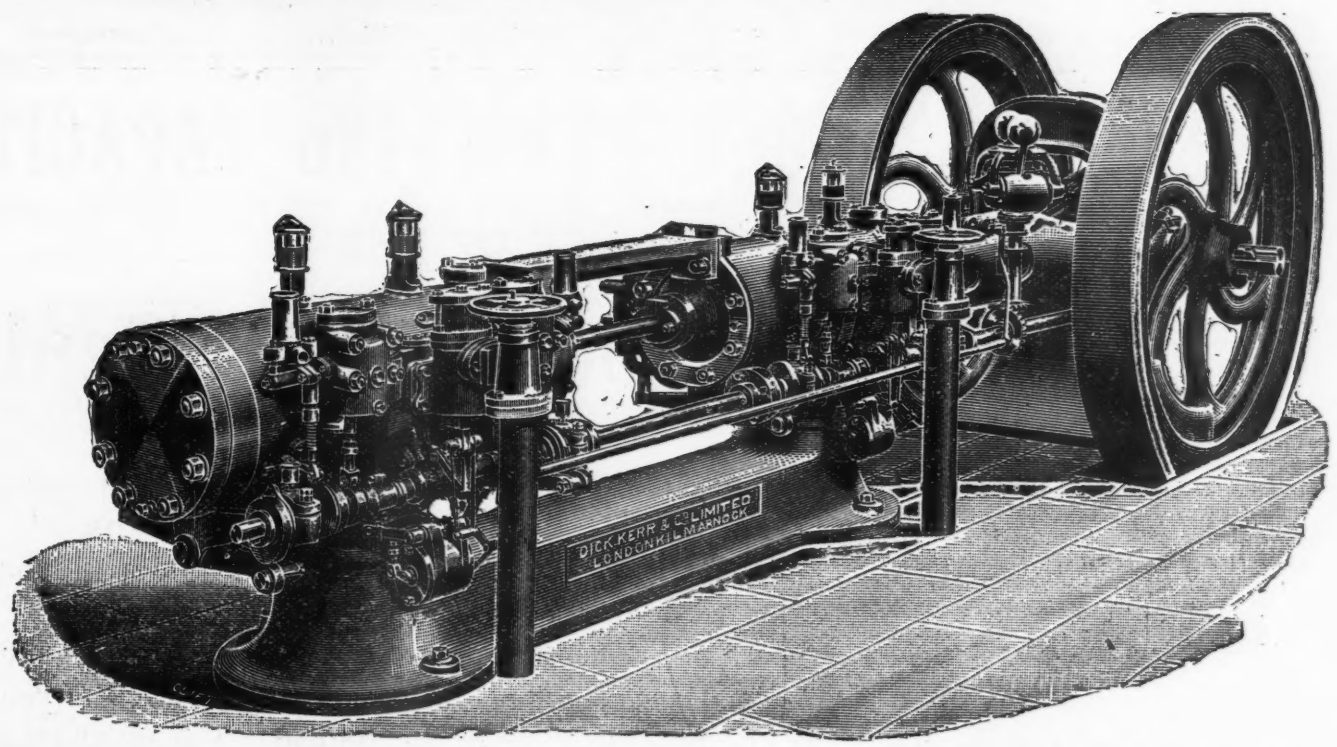

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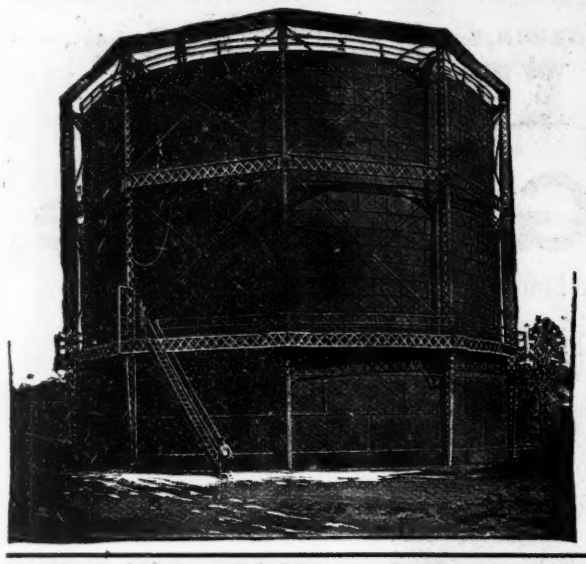

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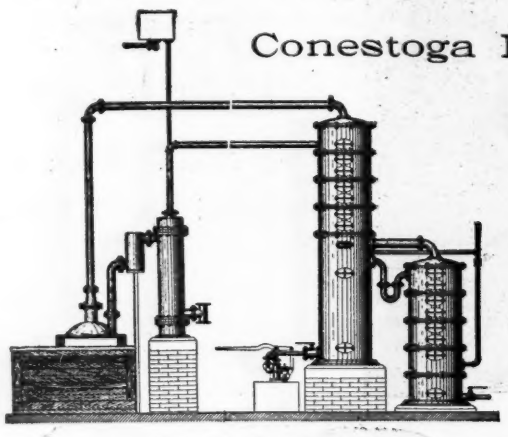

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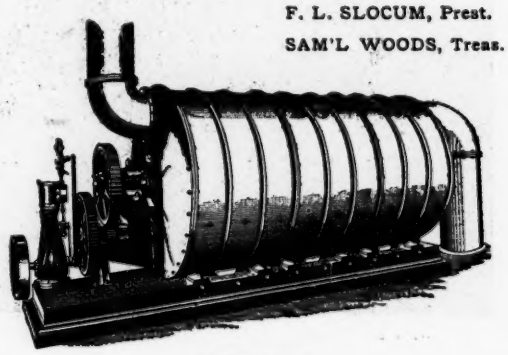

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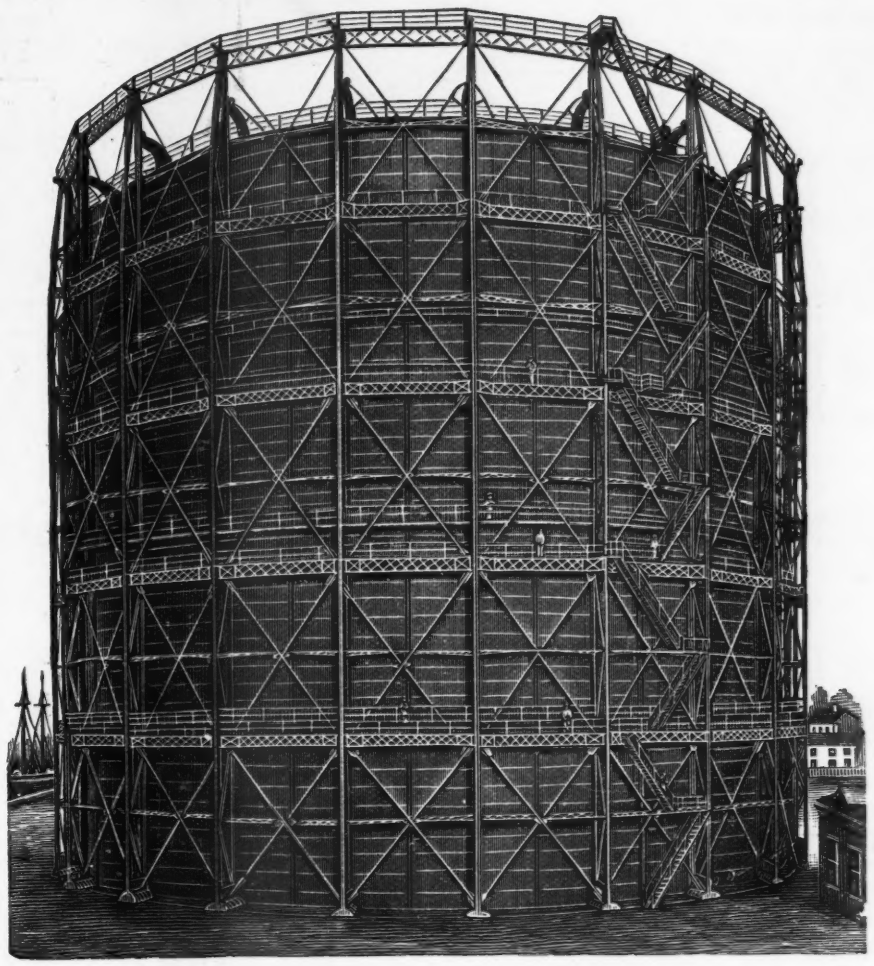

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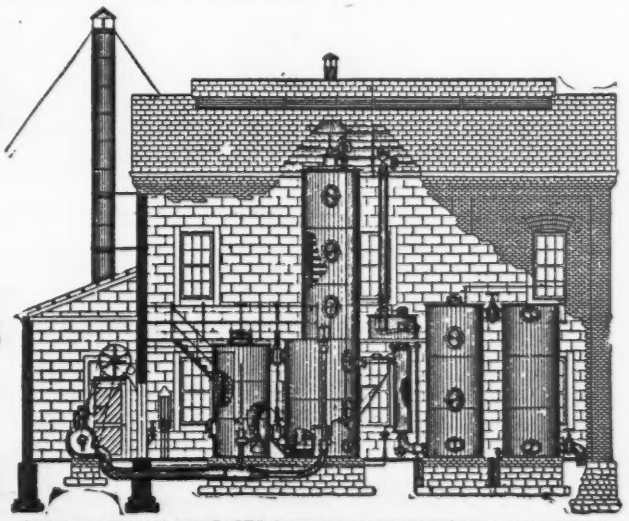

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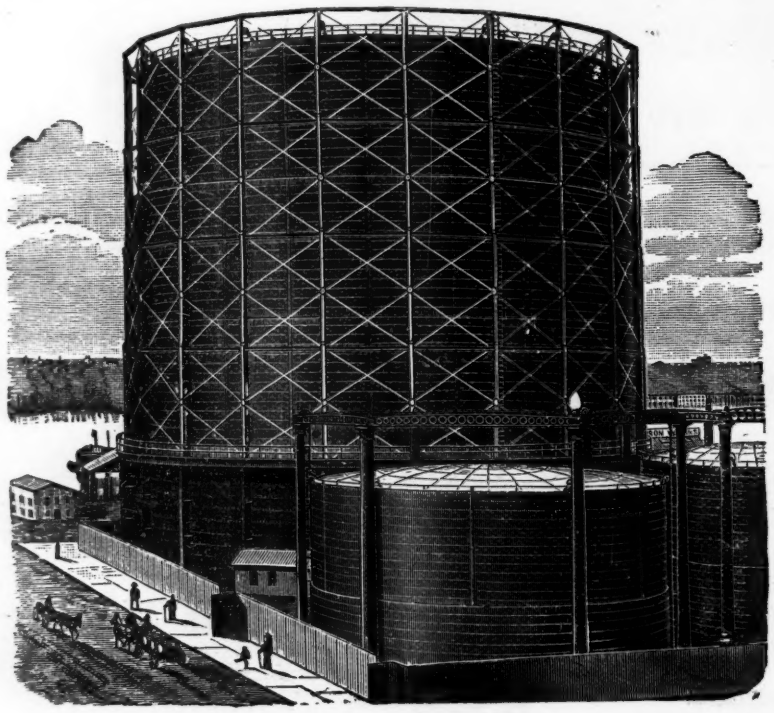

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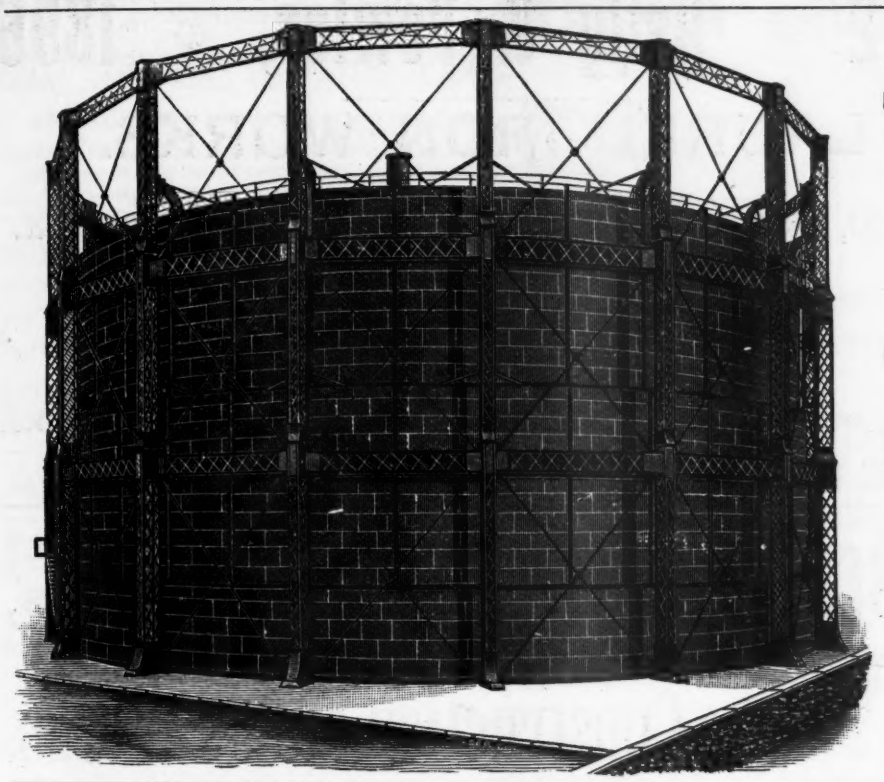

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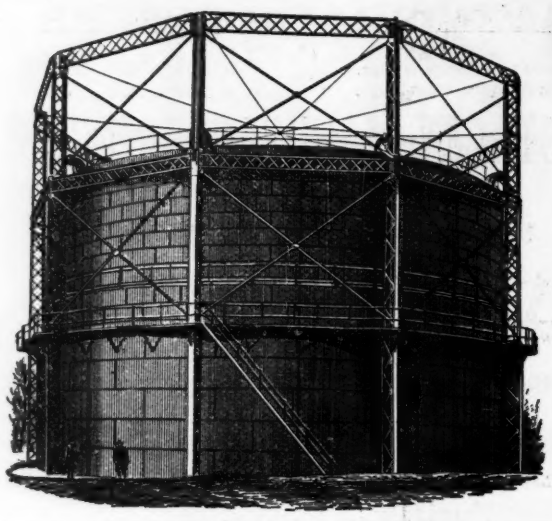

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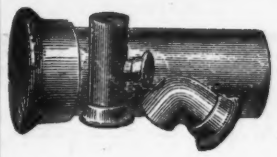

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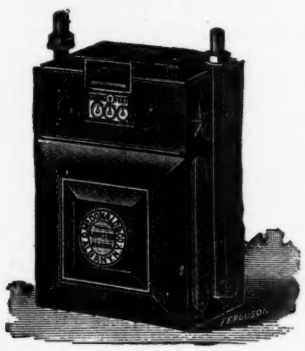

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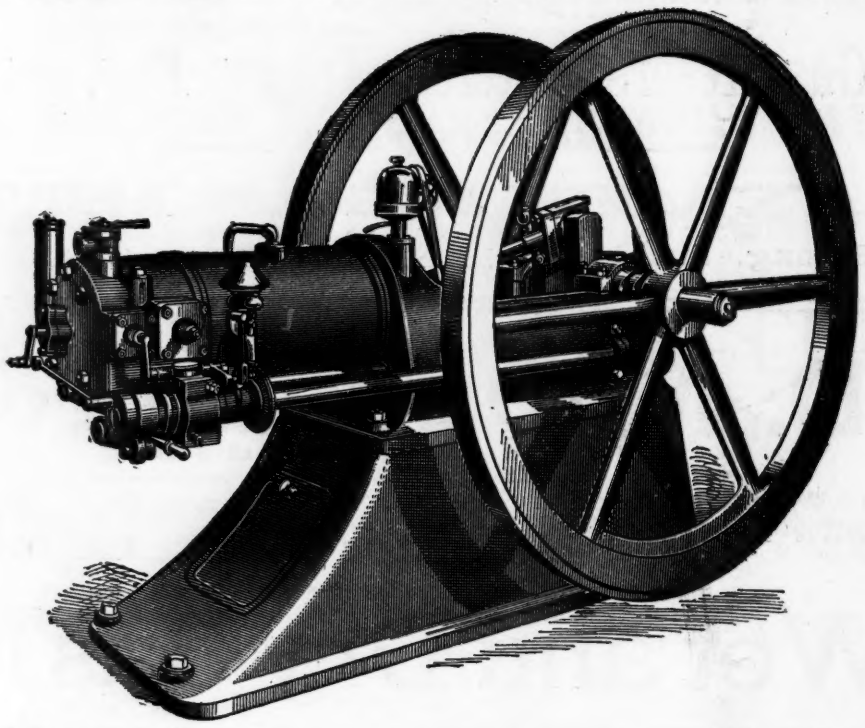

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